USER MANUAL

PYRAMID EX
400-1000kVA

Uninterruptible Power Systems

INDEX

INTRODUCTION

PYRAMID EX Uninterruptible Power Supply provides critical loads with continuous computer grade power. Reliability and performance are the key design considerations. The UPS design also maximizes isolation of the load from disturbances and interruptions, minimizes maintenance and repair time with its slide out modular system, and provides monitoring of significant system operating characteristics.

Proper installation and operation of the UPS are equally important factors in system reliability. This manual provides complete information on installation, operating and preventative maintenance of the UPS and Battery Cabinet. Illustrations showing the function of all operator controls, instruments, alarms and indicating lights are also given.

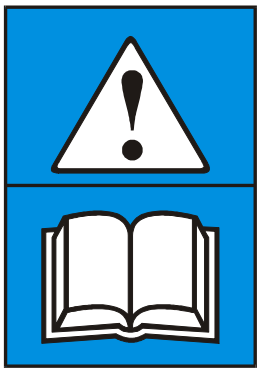
WARNING

The equipment manufacturer supplies this User manual to the companies that will actually use the equipment.

Reprinting part or whole of this User manual is forbidden.

This User manual is to be used only inside the works in order to find all necessary information to prevent injuries and to install and use the U.P.S.

WARNING



PLEASE READ THIS TECHNICAL USER MANUAL VERY CAREFULLY BEFORE CARRYING OUT INSTALLATION PROCEDURES

PLEASE KEEP THIS USER MANUAL IN A WELL-KNOWN PLACE WITHIN REACH OF ALL UPS USERS

In this User manual you will find explanations on how to install, set-up, and use the UPS.

All technicians and users who are about to use these UPS should have previously read this User manual.

Only qualified Technicians must carry out the installation and maintenance.

Inside this machine there are continuously operating fans, therefore do not insert any type of object in the ventilation grids.

Please use protective rubber gloves when working on damaged batteries.

Never remove the doors and protection covers while the equipment is operative.

When working on the UPS you must remove any metallic objects you may be wearing, such as rings, watches, pens and any other type of object which could provoke a short circuit when operating inside the machine.

There are dangerous voltages in the uninterruptible static power supply even when it's turned off with all the switches switched off and with the access covers removed!

There is a dangerous voltage at the ends of the batteries even when the switches are disconnected.

Please operate very carefully on the batteries; a short circuit can cause great damage to people or things.

Do not smoke and do not use a naked flame when working on the equipment.

If the uninterruptible power supply system or the room where this is installed should catch fire never use water to put out the flames.

CAUTION!

EMERGENCY PROCEDURES

If there is an emergency it is possible to disconnect the power supply charge by switching off all the switches on the control panel. On the machines that are equipped you may press the E.P.O. button.

PEOPLE HIT BY ELECTRICAL DISCHARGE

Ask immediately for the help of a qualified and trained person.

When a rather high voltage and high intensity electric hit a body current this can provoke burns. The burns appear in and around the areas where the current enters and exits the body. Even if only small burns are visible on the skin, the tissues beneath could be seriously damaged. In any case, and however serious the burn may be, NEVER TOUCH the injured person with bare hands until you are sure that the electricity has been cut off.

SYMPTOMS AND SIGNS
Redness, edema, skin burns or skins carbonisation in the areas where the electricity entered and exited the body.
The person may loose consciousness.
The person may stop breathing or his/her heart may stop beating.
Shock symptoms.

FIRST AID
Cut off the power supply and move the injured person away from the source of contact. Call immediately for an ambulance and, if necessary, for the help of a technician specialised in electrical equipment.

PEOPLE WHO HAVE COME INTO CONTACT WITH CORROSIVE LIQUIDS

Ask immediately for qualified expert help.

All batteries installed in this system are completely dry and no corrosive liquids leak out of their cases if the batteries are in perfect condition. If the storage batteries get damaged in any way, this could provoke the leakage of the electrolyte or a short circuit of the internal cells; the electrolyte is corrosive and causes burns.

SYMPTOMS AND SIGNS
A piercing sensation on the skin
The skin will appear reddened sometimes with small blisters and exfoliation.

FIRST AID
Place the injured area under a strong jet of cold running water for at least 10 minutes so as to avoid further damage to the tissues. N.B. Make sure that the water can flow away freely as the substance that caused the burn contaminates it. While swilling the injured area be careful not to splash yourself with contaminated water. Call for an ambulance immediately.
.
If the electrolyte comes into contact with eyes you must intervene immediately by washing them with running water until expert medical help arrives.

If the battery electrolyte is swallowed it is advisable to make the injured person drink plenty of milk or water.

IN ALL CASES ASK FOR EXPERT MEDICAL HELP

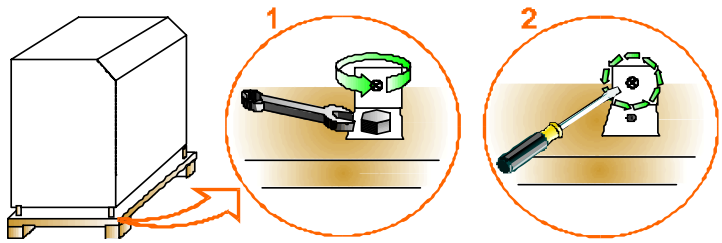
1 VERIFYING THE U.P.S.

After making sure that the goods are those required, please check that the equipment has not been damaged. In order to do this you must verify the integrity of the packaging. After having removed the packaging check that the metal panels have not been damaged during transport. If the goods are damaged then please ask the transporter company to verify a report about the damage in order to be able to make a claim to insurance company. If the goods are not compliant in any way with refer to ordered items then please contact your contact person from the head office.

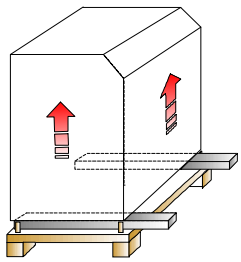
2 HANDLING, STORING AND POSITIONING

2.1 HANDLING

1. Remove the screws which fasten the machine to the pallet (Picture 2.1)
2. Remove the wooden pallet by using a lift truck and carefully place it on the floor (Picture 2.2)
3. For floor handling you will only need a transpallet with a suitable loading capacity



Picture2.1



Picture 2.2

2.2 U.P.S. STORAGE

2.2.1 U.P.S.

If you need to store the UPS this must be protected from dust and dirt (even if it is well packaged). It must not be exposed to the inclemency of the weather and the room shouldn't be too humid, nor should the UPS be exposed to sources of heat; room temperature should be between +0 to +40°C.

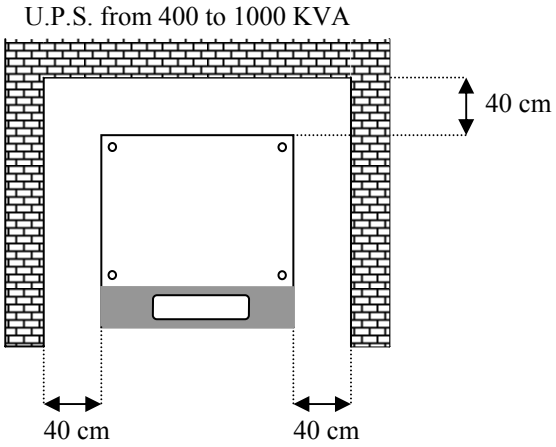
2.2.2 BATTERY CABINETS

If you need to store a complete battery cabinet, you should respect all the conditions mentioned in the previous paragraph. You should also remember that battery discharge over time, even when not in use, therefore **it is necessary to recharge them every 4 months.**

In any case, you must follow the manufacturers' indications to store the batteries. Non-compliance with these indications can cause an efficiency decrease and a shorter life of the storage batteries.

2.3 POSITIONING

Installation space varies according to the size of the U.P.S and to the battery cabinet. A distance margin from the walls of the room where the U.P.S. is positioned is also necessary for air circulation and ordinary/extraordinary maintenance. Please refer to picture 2.3 for minimum margin distances. All models need a distance margin of at least 40cm either side or at least a metre from the ceiling.



Picture 2.3

2.3.1 CHOOSING THE ROOM

Element	Requirements
Room access	• All the doors which the equipment has to go through in order to reach the chosen room have to be large enough to allow the passage of the U.P.S (charts 8) and its handling equipment. We advise you to forbid access to the place where the U.P.S. and its battery cabinets are placed to all non authorized users.
Room size	• Room space must be suitable to allow installation of the equipment and periodical and extraordinary maintenance. • When choosing the rooms please remember that the equipment must not be exposed to the inclemency of the weather, to corrosive substances, to excessive humidity (humidity below 90% non-condensing) or to very high sources of heat. • The environment should not be very dusty. Please be very careful if you decide to carry out any building work after setting up the machine.
Floor load	• According to the data in charts 8 you must check that the floors of the chosen rooms can support the equipment's weight.
Ventilation	• Room temperature should be preferably between 15° and 25°C • Ventilators expel the heat dissipated by the U.P.S. into the air, therefore the room structure must be suitable to guarantee sufficient aeration to eliminate the heat produced by the U.P.S. • If room temperature does not comply with the recommended parameters or if air circulation in the room is not adequate, you must supply the room with a ventilation system or, if this should not be sufficient, install an air conditioning system.
Safety rules	• The rooms where the U.P.S. is installed must be equipped according to fire and safety regulations.

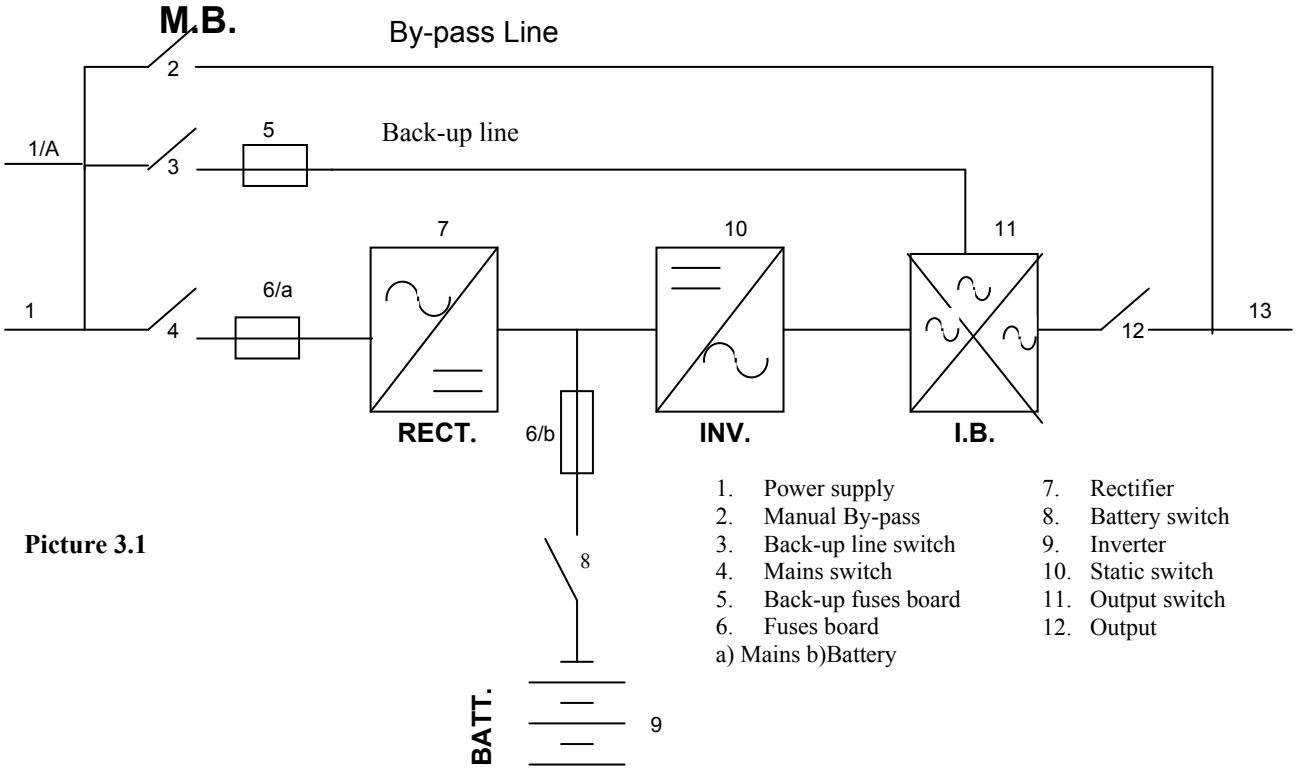
3 GENERAL DESCRIPTION

3.1 OPERATING PRINCIPAL

The U.P.S. is a continuous double conversion system with an output transformer. It works by carrying out a continuous double conversion of the main supply, guaranteeing a constant stabilized supply of both voltage and frequency, maintaining charge and control of the batteries (On-line functioning). In order to guarantee continuous supply when the voltage of the electric system are no longer correct, power is drawn from the batteries. The system is supplied complete with an automatic static commutator that connects the output to the back-up power supply, or if there are special alarms such as the E.P.O. (Emergency Power Off) it shuts down completely output voltage.

3.2 DESCRIPTION AND PARTS

During normal functioning (figura 3.1) the system takes power from the mains by means of the input terminal (1). The voltage goes through the disconnecting switch (4) and the fuse board (6/a) in order to reach the rectifier module (7), exiting which is a continuous controlled voltage available to charge or maintain battery efficiency (cross fuse (6/b) and battery switch (8)) and to the inverter input (10). This step is to generate a three-phase voltage, stabilized and synchronized with the back-up voltage. The static commutator (11) selects the power source to power the load, usually on inverter (10). If there is an increase of output current or with specific alarms, the device (11) will commutate to the emergency supply maintaining output continuity. If transferring takes place, output continuity is allowed by the synchronism of the voltages generated with the emergency voltage. If asynchronous commutation should take place there will be a power "dip" for maximum 20 ms.



Picture 3.1

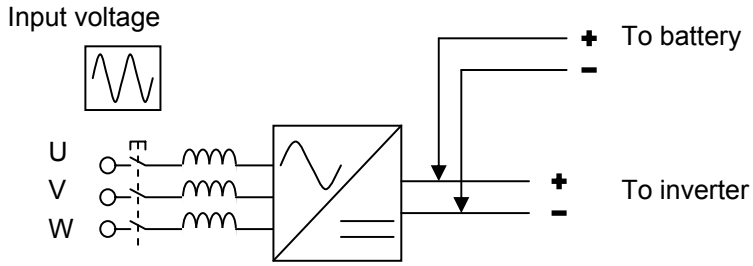
1. Power supply
2. Manual By-pass
3. Back-up line switch
4. Mains switch
5. Back-up fuses board
6. Fuses board

a) Mains b)Battery

7. Rectifier
8. Battery switch
9. Inverter
10. Static switch
11. Output switch
12. Output

When the power supply is not in the set parameters, the equipment maintains output voltage by taking power from the batteries (9). The system is provided with a current control that keeps the current inside set parameters in the event of current overloaded.

3.1.1 RECTIFIER



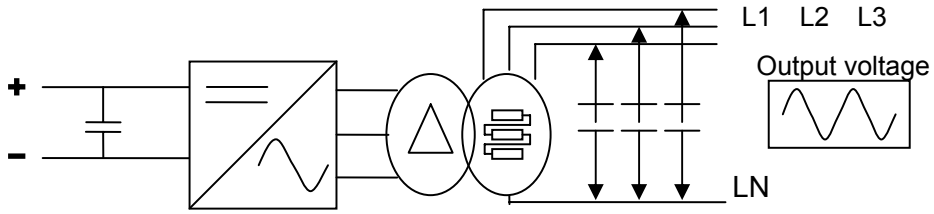
Picture 3.2

Rectifier indicated in picture with the abbreviation RECT, transforms alternating current voltage from main line to direct current voltage. Its engineering allows, through a six pulse absorption to feed the inverter in its status of maximum voltage output at the same time as the battery charge. Normally, direct current voltage is constantly set at 436Vdc (sustaining voltage), but when recharging the batteries, this voltage will be automatically limited by a current limiter.

In the following description the link from rectifier to inverter is defined as "Dc-link" and the voltage between its poles is defined as "Dc link voltage"

3.1.2 INVERTER

The inverter, indicated in picture 3.1 with the abbreviation INV, has the role of transforming direct current voltage, taken from the rectifier output, into sinusoidal voltage, which may be used by the user; This process is carried out by using power semiconductors, piloted by a PWM signal, which through a transformer and a capacitance filter give us a very stable three-phase voltage with a harmonic distortion lower than one unit.
The controlling logic of the inverter also controls output current intensity limiting it to a value which corresponds to 150% nominal current voltage.



Picture 3.3

3.1.2 STATIC COMMUTATOR

The static commutator indicated in picture 5 as B.S., is a commutator made with semiconductors which can select which power source to connect appliances to. During normal functioning the U.P.S. output is taken at the inverter output (U.P.S. on-line), but if there is an internal or external event it will commute to the reserve system.

Commutating from one source to another occurs without creating voltage "dips" only with conditions of synchronism between inverter output and the reserve system. If there is forced commuting, without synchronism, decided by the user, this will occur with a voltage dip of max. 20 Sec.

Commuting Conditions on inverter:

1. Inverter switched on and working and synchronized with the reserve system
2. Loss of system
3. Voluntary forcing through control panel

Commuting Conditions on reserve:

1. Malfunctioning of the inverter
2. Current overcharge
3. U.P.S. switched off
4. Voluntary forcing through control panel
5. By-manual closing of the breaker

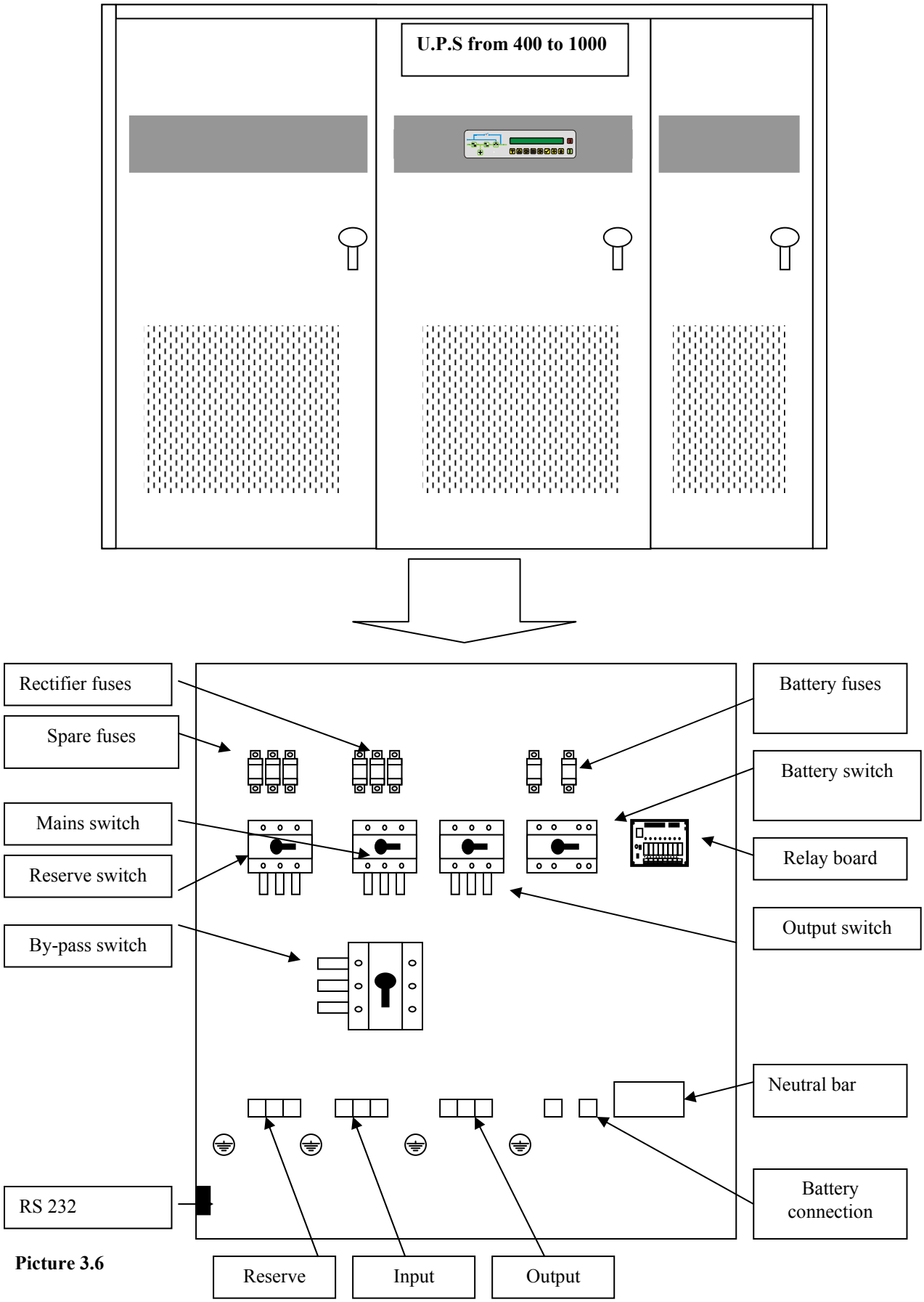
3.1.4 MANUAL BY-PASS

The manual by-pass , indicated in picture 3.1 as M.B., consists in a breaker which powers the critical load directly from the main system. This device is particularly useful during ordinary/extraordinary maintenance, as it allows the operator to deal with the internal circuits with a minimum risk of contact with live elements.

3.1.5 LAYOUT

It is important to be familiar with the parts that are necessary during the connection procedures before connecting the equipment. In order to access the parts which will be described you must remove the “second access”, which is the metal panel used to protect the inside parts of the U.P.S. and also to protect the user from accidental contacts with live parts.

KEY
A = Display board B = Relay board C = Interface connector D = Terminal E = Breakers F = Fuse cards  = Earthing


U.P.S from 400 to 1000
Rectifier fuses
Spare fuses
Mains switch
Reserve switch
By-pass switch
RS 232
Battery fuses
Battery switch
Relay board
Output switch
Neutral bar
Battery connection
Reserve
Input
Output

Picture 3.6

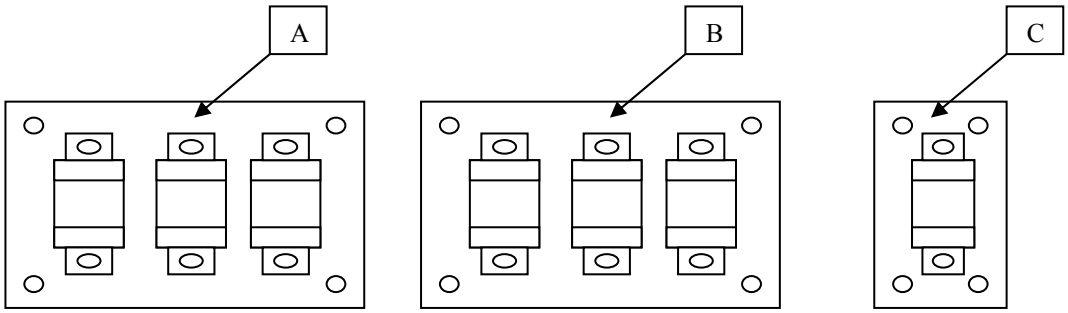
3.1.6 BREAKERS

The U.P.S. has a system of breakers, which allows the user to carry out the necessary operations in order to use and carry out maintenance on the equipment and to shut down the power supply if there is an emergency. A sticker placed on the second access specifies the name of each switch near the switch itself. The by-pass switch contains a protection device so, as it cannot be disconnected inadvertently. The user can remove this protection device if he/she decides to carry out a manual by-pass.

1.	MAINS SWITCH	Break the mains supply, as specified in point 1 picture 3.1
2.	RESERVE SWITCH	Break the secondary power supply, as specified in point 7 picture 3.1
3.	MANUAL BY-PASS	Short-circuits the secondary input with the output
4.	OUTPUT SWITCH	Break the loading power supply.
5.	BATTERY SWITCH	Break, according to the model, one or both battery polarities.

3.1.7 FUSES

The U.P.S. includes a system with two fuse groups, both counting three fuses each which are able to disconnect electrical power input (points 1 and 7 picture 3.1), when the electrical power is not within the set parameters. The type of fuse, which is used, guarantee quick intervention and therefore are a guarantee also for optimum protection of the internal devices. Furthermore, there is also a fuse on the line, which connects the U.P.S. to the batteries (point 6 picture 3.1), both for internal and external batteries.



Picture 3.7

Board A, (picture 12), to the user's left, protects the state of the rectifier input, board B , to the user's right, protects the reserve line. Whereas the single-fuse board C protects the battery line. The fuses are on connection bars without board, for battery there are two fuses.

REPLACING THE FUSES

CAUTION! : ALL CONNECTING PROCEDURES DESCRIBED IN THIS CHAPTER MUST BE CARRIED OUT BY AUTHORIZED ELECTRICIANS OR BY QUALIFIED TECHNICIANS.

CAUTION! : BEFORE REPLACING THE FUSES YOU MUST CARRY OUT THE MANUAL BY-PASS PROCEDURE WITH THE U.P.S. DISCONNECTED (CHAPTER 5)

A nut screw fastens each fuse. When replacing a fuse you must unscrew the two knurled nuts corresponding to the fuse, which must be replaced, remove the washers, replace the fuse and put back the washers and the knurled nut in this order. IMPORTANT spare fuses are supplied together with the U.P.S. If they have to be purchased please make sure that they are extra-fast fuses for the current same as on machine so as to guarantee total protection.

4 CONNECTING THE U.P.S. TO THE MAINS SUPPLY

CAUTION! : ALL CONNECTING PROCEDURES DESCRIBED IN THIS CHAPTER MUST BE CARRIED OUT BY AUTHORIZED ELECTRICIANS OR BY QUALIFIED TECHNICIANS.

CAUTION! : THE U.P.S. NEED A NEUTRAL WIRE. THE SYSTEM CANNOT WORK WITHOUT IT.

4.1 COMPATIBILITY WITH THE POWER SUPPLY

The parallel connection to the public mains is normally allowed, as the U.P.S. is comparable to a passive charge. The mains supply must supply a higher power than the U.P.S rated power as it has to take into account several factors, such as:

1. Power absorbed by the output charge on the uninterruptible power supply
2. System efficiency
3. Power needed to charge the batteries
4. Input harmonic distortion

If you know the amount of power needed by the connected electrical equipment and you can evaluate the probable expansion margins it is possible to make a first rough estimate of the power required. As for the power absorbed by the batteries while charging, you can easily work out the power required by multiplying 436 times 1/10 of the total battery capacity (E.g.: For a 40A/h battery space, the power needed to charge the battery will be: 436 X (40 / 10) = 1,744 kW). As for input harmonic distortion please remember that for the power supply the uninterruptible power supply is to be considered as a non-linear load, which generates harmonic frequency currents multiples of the (50/60 Hz). In function of the line impedance these create a harmonic voltage distortion. This latter value (total harmonic voltage distortion) must not exceed the specific environment reference parameters. There are several ways of reducing this parameter: by increasing the power supply, the section of power supplies cables or by choosing an interruptible power supply with specific features (twelve-phase input, with filter).

4.2 INDIRECT POWER SUPPLY

4.2.1 TRANSFORMER

If you are using a system input isolation transformer this will reduce distortion effects and stop its diffusion in the system. Therefore, apart from decreasing harmonic disturbance you can also probably avoid oversizing the power supply line.

4.2.2 GENERATOR

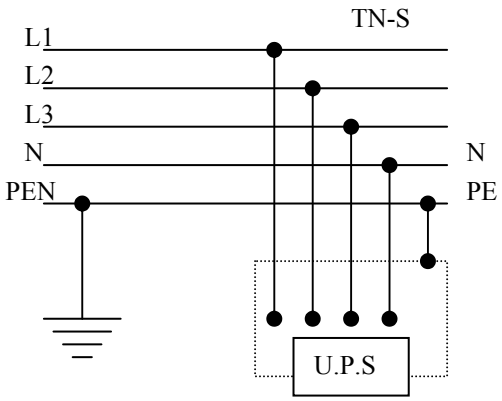
Particular attention must be paid when sizing a possible input power unit; this has high output impedance, which is defined on the rating plate as subtransient reactance of the alternator. This parameter makes a negligible harmonic current distortion become a seriously disturbing element for the correct functioning of the U.P.S.

4.3 INPUT WIRE SIZING

When choosing the wire you must bear in mind a technical, economical and safety evaluation. Technically speaking, the main factors that affect wire sizing are voltage, current, overcurrent, temperature and how the wires are laid. However, it is always a good rule to size the wires so as the voltage drop on each wire is below 3% of the applied voltage. Particularly important is the sizing of the neutral wire especially when the U.P.S. is used to power unbalanced loads or loads with strong harmonic distortion. Taking into account these last remarks, the enlargement factor must be decided according to the size of the phase wire (usually 1,5-2 times).

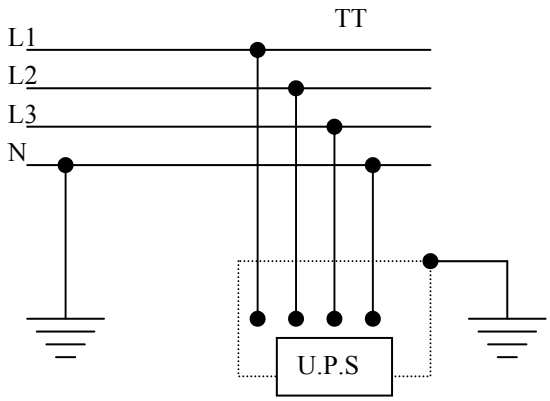
4.4 PROTECTION OF THE U.P.S. OUTPUT LINE

The main electric distribution systems to which the U.P.S. can be connected are the TN-S and TT systems (pictures 4.1 and 4.2). If you do not have this type of equipment please talk to a specialized technician. The protection devices, which can be applied to the U.P.S. output line, are against overcurrent and are differential. As for their size, please bear in mind that if there is a power shortage the U.P.S. works on its own (disconnected from the main line), with a current restriction equal to 150% of the rated current, therefore in order to protect against overcurrent you must choose a device that is activated within this threshold. As for differential protections you must use type A differentials (for alternate current and for switches with continuous components), which are low sensitivity (0,3–0,5-1 A).



The TN-S system has the neutral grounded in a specific point to which the system's earth is also connected with a separate protection wire.

Picture 4.1



The TT system has the neutral grounded in a specific point and the system's earth is connected to an earth which is independent from the neutral. This is the most used device at distribution level.

Picture 4.2

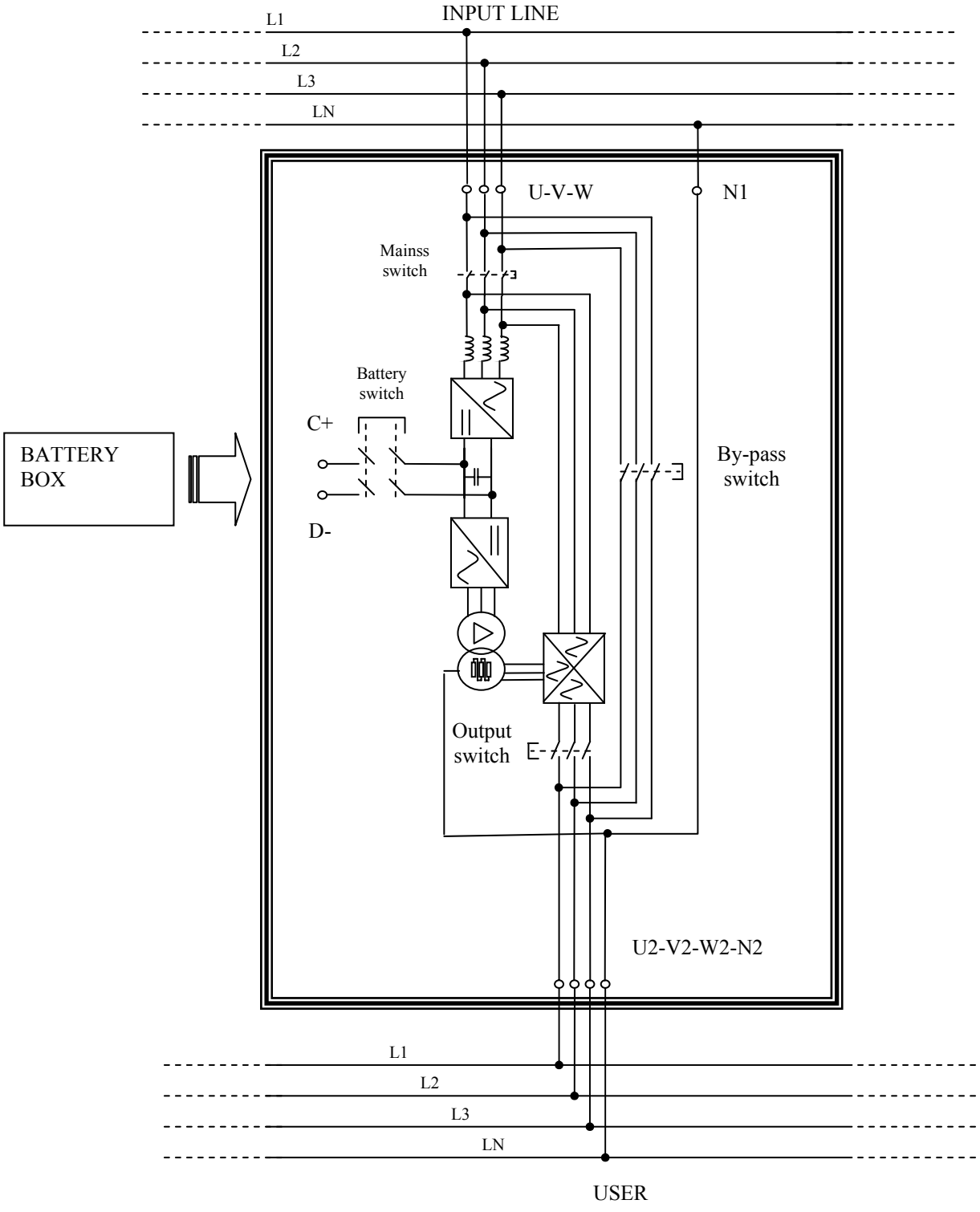
4.5 CONNECTING THE SYSTEM

To connect the U.P.S. you must carry out the following procedures:

1. Open the front door, the key is attached to one of the supporting feet
2. Shutdown all breakers.
3. Verify the integrity of the by-pass breaker lock out
4. Make sure there is no voltage on the mains supply
5. Unscrew the second access panel setscrews and remove the panel
6. Connect the earthling wire for the mains to the earth bar
7. Connect the general mains to the U, V and W terminals of the U.P.S. (in cyclic sense)
8. If the back-up supply mains are available disconnect the jumpers from terminals U1 and U, V1 and V, W1 and W, then connect the back-up supply to the U1, V1 and W1 terminals
9. Connect the supply mains neutral wire to the N1 terminal
10. Connect the mains that power the connected electric equipment to U2, V2 e W2 terminals at the U.P.S. output
11. Connect the mains neutral wire that powers the connected electric equipment to the N2 terminal at the U.P.S. output
12. If you need to connect external battery compartments please proceed to the following paragraph.
13. Replace the second access panel and fasten its screws.
14. Lock the front door with its key

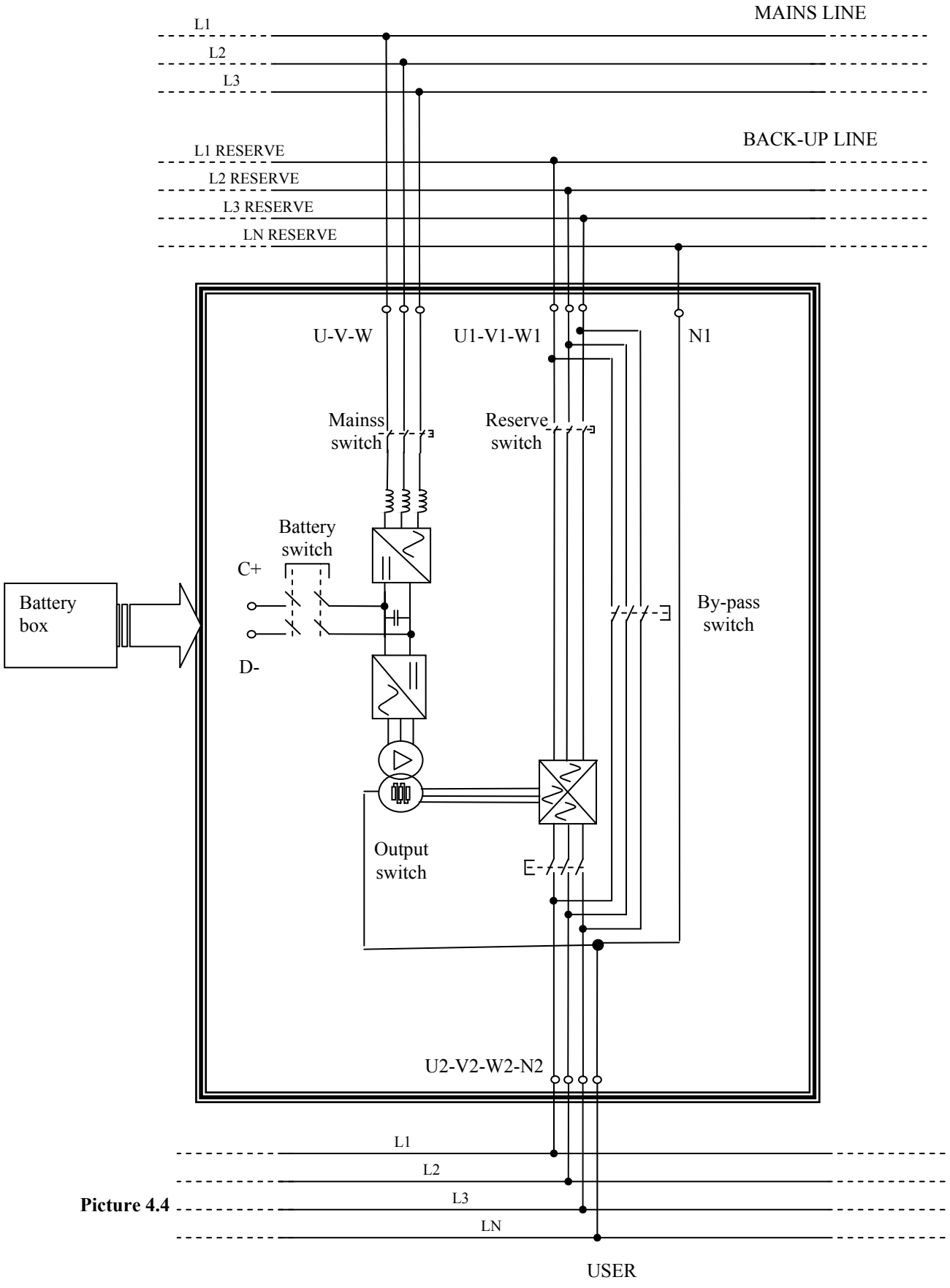
Reassemble the side grids on the supporting base

4.5.1 CONNECTION WITHOUT BACK-UP LINE



Picture 4.3

4.5.2 CONNECTION WITH BACK-UP LINE



Picture 4.4

4.6 CONNECTING THE BATTERIES TO THE U.P.S.

CAUTION! : ALL CONNECTING PROCEDURES DESCRIBED IN THIS PARAGRAPH MUST BE CARRIED OUT BY AUTHORIZED ELECTRICIANS OR BY QUALIFIED TECHNICIANS.

CAUTION! : FOR SECURITY REASONS THE BATTERIES ARE TRANSPORTED WITH SOME OF THE JUMPERS DISCONNECTED, THEREFORE PLEASE REMEMBER TO RE-CONNECT THEM. SEE CHAPTER 7

4.6.1 CONNECTION TO A BATTERY CABINET

1. Make sure that the U.P.S. is switched off and that all switches are off
2. Unscrew the setscrew from the second access panel of the U.P.S. and remove it
3. Unscrew the setscrew from the battery cabinet roof and remove it
4. Make sure there is no voltage on the U.P.S. battery terminals and on battery box terminal
5. Connect the earthling wire to the earth bar of the U.P.S
6. Connect the earthling wire to the earth bar of the U.P.S
7. Connect the two wires, supplied to connect the external battery cabinet, to the C and D terminals of the U.P.S. (C= positive, D= negative)
8. Connect the wires from the U.P.S. to the C and D terminals of the battery cabinet
9. **N.B. Check and control all the connections of the jumpers inside the batteries of the battery cabinet**
10. Make sure that the corresponding battery breaker placed on the U.P.S is off, then shut down the battery switch on the cabinet
11. Using a multimeter verify the correct polarity on the U.P.S. battery terminals
12. Close the second access of the U.P.S. by fastening its screws
13. Close the battery cabinet roof by fastening its screws
14. Reassemble the side grids on the supporting base

4.6.2 CONNECTION TO A 180cm HEIGHT BATTERY CABINET

1. Make sure that the U.P.S. is switched off and that all switches are off
2. Unscrew the setscrew from the second access panel of the U.P.S. and remove it
3. Open the front access door of the battery cabinet with its key
4. Make sure there is no voltage on the U.P.S. battery terminals
5. Connect the earthling wire to the earth bar of the U.P.S
6. Connect the earthling wire to the earth bar of the U.P.S
7. Connect the two wires, supplied to connect the external battery cabinet, to the C and D terminals of the U.P.S. (C= positive, D= negative
8. Connect the wires from the U.P.S. to the C and D terminals of the battery cabinet
9. **N.B. Check and control all the connections of the jumpers inside the batteries of the battery cabinet**
10. Make sure that the corresponding battery breaker placed on the U.P.S is off, then shut down the battery switch on the cabinet
11. Using a multimeter verify the correct polarity on the U.P.S. battery terminals
12. Close the second access of the U.P.S. by fastening its screws
13. Reassemble the side grids on the supporting base

CAUTION! : THE U.P.S. AUTONOMY DEPENDS ON THE STATE OF THE BATTERIES; A CORRECT AND PROGRAMMED MAINTENANCE IS FUNDAMENTAL TO AVOID A BAD CONDITION OF THE BATTERIES FROM HAMPERING U.P.S. FUNCTIONING WHEN NECESSARY.

NOTE: WHEN BATTERIES ARE CONNECTED DON'T CLOSE BATTERY SWITCH IF UPS IS OFF

4.7 MECANICAL OPERATIONS

4.7.1 OPEN FRONT PANEL

- Open the lock with supplied key
  Open door where the control panel is mounted

4.7.3 REMOVE SECONDARY DOOR

- Open front panel
- Remove screws on sides
- Remove ground wire fix on secondary door (remember to connect it before closing secondary door)

4.7.4 REMOVE ROOF

- Remove the four screws on roof
- Lift roof
- Remove ground wire fix under roof (remember to connect it before closing roof)

4.7.1 REMOVE SIDE DOORS

- Remove the four screws on side door
- Lift door
- Remove the four screws on roof
- Remove ground wire fix on door (remember to connect it before closing door)

5 STARTING-UP AND SHUTTING DOWN THE MACHINE

5.1 STARTING-UP THE MACHINE

CAUTION! : IF THE BATTERY BREAKER IS CLOSED, BEFORE STARTING UP PYRAMID EX, THIS CAN CAUSE U.P.S DAMAGE.

5.1.1U.P.S with independent reserve line

1. Make sure that the wires are correctly connected respecting the cyclic sense of the phases U,V,W
2. Make sure that the "Manual By-pass" switch is turned off and blocked by its blocking device
3. Give power to the mains
4. Close the "Reserve switch" breaker, the display will turn on and the message "UPS STOPPED" will appear, all the synoptic led's will be red except led "H " which remain green; wait till led "A" start flashing, if this does not happen the supply voltage is not adequate or the cyclic sense of the phases is incorrect, therefore you must disconnect the equipment, verify the connections and start this procedure again from the beginning.
5. Close the "Mains switch" and "Output switch" breakers, led's "G and B" will turn green
6. Press the  button for about two seconds, on the display the message "switch on procedure started" will appear, if the steps of procedure have been followed correctly led "C" and led "E" will become green and the message "UPS in alarm mode" will appear
7. Once you have carried out the turning on procedure and led's "C" and "E" are green, it is possible to close the "Battery switch" breaker and led "D" will be green.
8. If installation has been correctly carried out and the turning on procedure done successfully, the message "UPS in normal operation operation" will appear and all the synoptic led's will be green
9. Go to paragraph 5.1.2

5.1.2 First time starting-up

If the turning on procedure has been carried out for the first time we advise you to continue this procedure to verify the real efficiency and to get familiar with the system

1. Select the language you wish to use by following the indications in the menu (diagram 1a/b)
2. Carry out the battery test (see 6.1.2.2) and verify the outcome
3. Carry out the complete by-pass procedure with the U.P.S. switched on (paragraph 5.1) and all operations to restore the by-pass
4. Carry out a power shortage test by turning off the "Mains switch" and make sure that the U.P.S. goes into alarm mode and that led D starts flashing and led F stays green (picture 1and 7) then turn on the "Mains switch" and check that normal functioning has been restored.

5.2 SHUTTING DOWN

CAUTION! : THE FOLLOWING PROCEDURE WILL DISCONNECT THE LOAD!

In order to turn off you must:

1. Press for about 5 seconds the O button. On the display the message "TURN OFF UPS" will appear and leds "C","E" and "F" (picture 17) will be red and the message "UPS STOPPED" will appear on display
2. Open "Output switch" and led "G" will be red
3. Open "Battery switch" and led "D" will be red
4. Open "Reserve switch" and led "A" will be red
5. Open "Mains switch" and the U.P.S. will be off completely

5.2.1 EMERGENCY POWER OFF SWITCH (optional)

The Emergency Power Off switch (E.P.O.) allows, after pre-setting the function, U.P.S. shutdown **totally or partially** in emergencies. Standard setting only has the totally turned off feature. If you want to modify this set up please ask for a specialized technician to do. It is installed on the machine or on the remote control panel.

Specialised technicians can carry out After-sales installation only.

The switch on board the machine is on the right-hand side of the control panel; for the switch on the remote control panel, please see picture 19.

Partial shutdown results in deactivating the static and the inverter, which in consequence will turn off all the electric equipment connected to the system's output, whereas the rectifier and battery will continue receiving charge current.

Total shutdown deactivates all functions (including the rectifier). During the emergency the message "WARNING emergency shutdown" will appear on the control panel. There are two ways to restore normal functioning:

5.2.2 RESTORING FROM EPO

RESTORING FROM PARTIAL SHUTDOWN: Press switch off button O for about three seconds then press the switch on button I for about five seconds and wait till the end of the shutdown procedure.

RESTORING FROM TOTAL SHUTDOWN: Press the switch on button I for about five seconds and wait till the end of the shutdown procedure.

6 ACTIVATING THE MANUAL BY-PASS

CAUTION! : IF YOU CARRY OUT THIS PROCEDURE INCORRECTLY YOU COULD DAMAGE THE U.P.S.
THE MANUFACTURER DECLINES ALL RESPONSABILITIES FOR DAMAGE DUE TO INCORRECT MANOUEVRING.

CAUTION! : DURING THE ENTIRE PERIOD OF FUNCTIONING IN BY-PASS MODE, THE ELECTRIC EQUIPMENT CONNECTED TO THE OUTPUT OF THE DEVICE WILL BE SUBJECT TO THE FLUCTUATIONS MAINS VOLTAGE.

This manual operation transfers the load directly to the mains during maintenance or if the equipment breakdown.

6.1 ACTIVATING THE BY-PASS SHUTTING DOWN THE U.P.S

1. Verify that led “A” is green .
2. Press the  button for about 5 seconds; the message “ Turn off U.P.S ” will appear on the display and leds “C”,”E” and “F” will turn red and the message “UPS stopped” will appear on the display
3. Turn on the “by-pass switch” breaker and led “D” will be red
4. Turn off the “Output switch” breaker and led “G” will be red
5. Turn off the “Reserve switch” breaker
6. Turn off the “Mains switch” breaker
7. Turn off the “Battery switch” breaker

RESTORING NORMAL FUNCTIONING FROM THE PREVIOUS CONDITION:

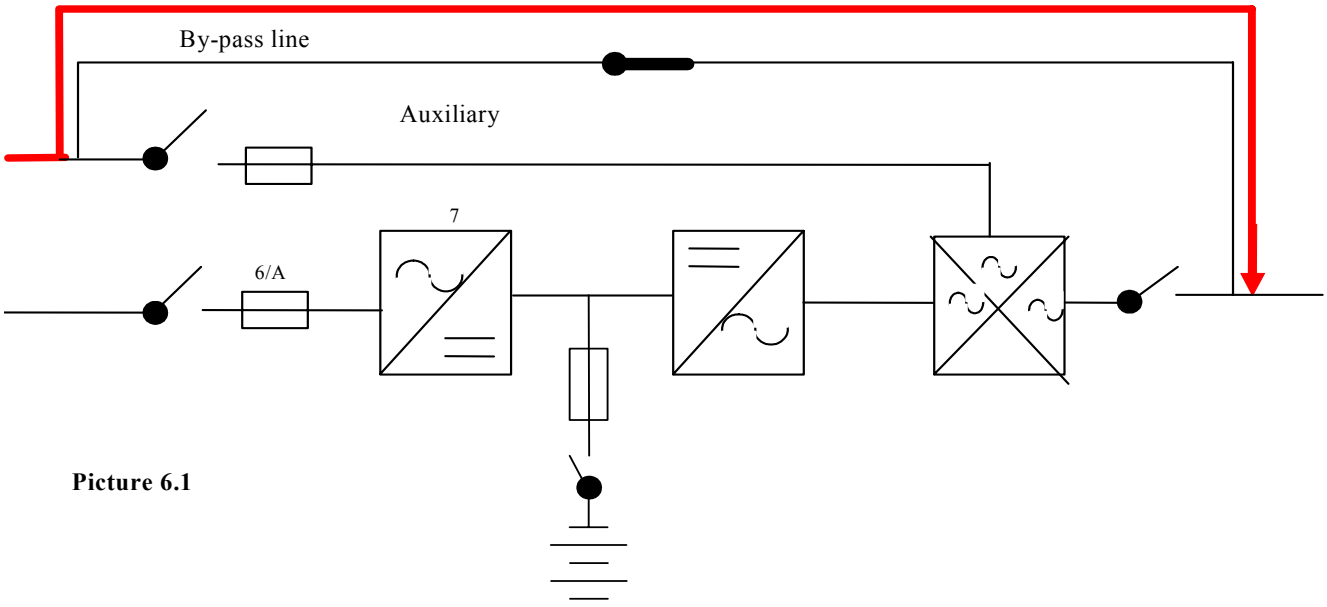
1. Turn on the “Reserve switch” breaker, the message “UPS Stopped” will appear on the display, all the synoptic leds will be red except led “H” remain green; wait till led “A” starts flashing, if this does not happen the supply voltage is not adequate or the cyclic sense of the phases is incorrect, therefore you must disconnect the equipment, verify the connections and start this procedure again from the beginning.
2. Turn on the “Main switch” e “Output switch” breakers, led “B” and led “G” will be green
3. Turn off the “Manual by-pass” breaker.
4. Press the  button for about 2 seconds; the message “Switch on procedure started” will appear on the display, if the procedure has been carried out correctly led “C” and led “E” will be green and the message “UPS in alarm mode” will appear
5. Once you have carried out the turning on procedure and that led “C” and “E” are green, it is possible to close the “Battery switch” breaker and led “D” will be green

6.2 ACTIVATING THE BY-PASS KEEPING THE U.P.S SWITCHED ON AND BATTERY CHARGING

1. Verify that led “A” is green
2. Press keys F6 and F2 at the same time, using the scroll keys select “On reserve” and confirm your choice by pressing F6; make sure that led “F” become yellow
3. Turn on the “Manual by-pass” breaker
4. Turn off the “Output switch” breaker

RESTORING NORMAL FUNCTIONING FROM THE PREVIOUS CONDITION:

1. Make sure the led “F” is yellow
2. Turn on the “Output switch” breaker
3. Turn off the “Manual by-pass” breaker
4. Press keys F6 and F2, at the same time and wait until led “F” turns green



Picture 6.1

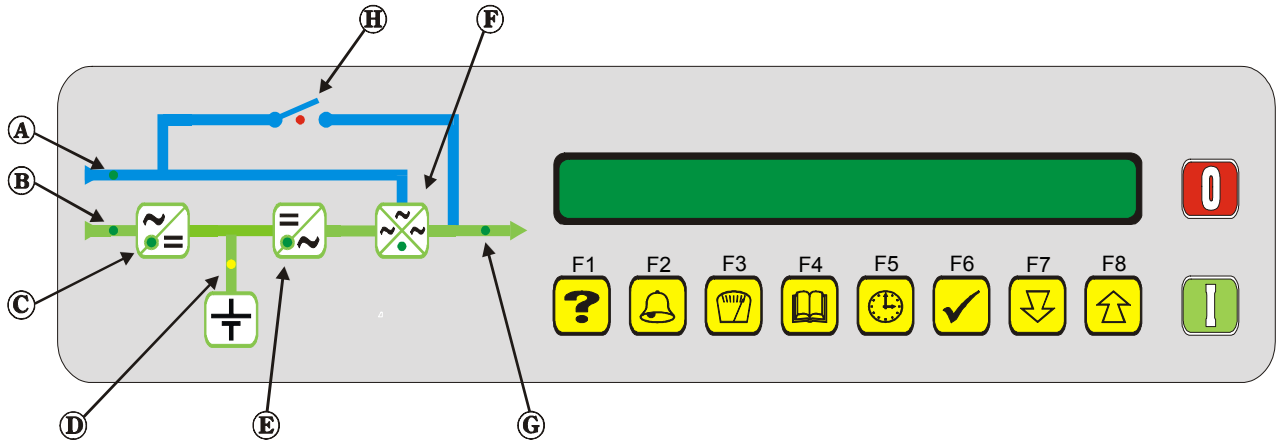
7 CONTROL PANNEL

The user can communicate with the U.P.S. in the following ways:

1. Using the control panel on the front of the control board
2. Using relay interface
3. Using a Personal Computer connected to the U.P.S.
4. Using the remote control panel (Optional)

You can connect all these check tools described above to the same machine without creating interference or incompatibility among the components. The use of optocopulers on all interfaces (except for relay interface) guarantees galvanic separation of the interfaces remote controlled from the U.P.S. assuring all connected equipment total protection from disturbance and interference.

7.1 THE CONTROL PANEL AND ITS FUNCTIONS



Picture 7.1

Panel check functions can be split into three main categories:

1. Monitoring
2. Diagnostic tools
3. Functioning mode configuration

In the interface system we refer to “elements”. For element we mean a group of components which concur to the same function.

ELEMENTS	DESCRIPTION
SYSTEM	Includes the U.P.S. as a whole
RECTIFIER	Includes devices for conversion from alternating to direct voltage
BATTERY	Includes the device for energy storage
INVERTER	Includes devices for conversion from alternating to direct voltage
BACK-UP	This is the emergency mains supply
BREAKERS	Includes all the breakers in the U.P.S.

7.1.1 MONITORING

Monitoring allows checking that all specific functions are within the set limits

ELEMENTS	AVAILABLE MEASUREMENTS
U.P.S. System	Phase-phase output voltage Phase-neutral output voltage Output current Inside temperature Load percentage
Inverter	Phase-phase output voltage Link DC voltage Link DC current Frequency
Rectifier	Input Voltage Link DC voltage Link DC current
Battery	Voltage Current
Back-up	Voltage Frequency

Chart 1

7.1.2 DIAGNOSTIC TOOLS

The diagnostic tools allow checking the U.P.S. functioning state, by checking for the presence of alarms in progress or already activated and Battery State.

The available diagnostic tools are:
1. Event menu
2. History menu
3. Battery test

7.1.2.1 LED

Led	Associated element	Colour	Meaning
A	Back-up mains supply	green	Back-up mains OK
		red	Breaker is off (*where is foreseen*)
			Incorrect input voltage
		flashing	Incorrect frequency
			Not synchronised
B	Rectifier mains supply	green	Rectifier mains OK
		red	Rectifier mains alarmed
		flashing	Incorrect cyclical sense
C	Rectifier	green	Rectifier OK
		red	Rectifier alarmed
			Rectifier off
D	Battery	green	battery OK
		red	Battery alarmed
		flashing	Battery discharging
E	Inverter	green	inverter OK
		red	Inverter alarmed
			inverter off
		flashing	inverter current over 125%
F	Static commutator	green	Static switch on inverter
		yellow	Static switch on back-up
		red	Static switch offline or blocked
G	Output voltage	green	Output voltage OK
		red	Incorrect output voltage
			Opened breaker
		flashing	Output current over the nominal value
H	By-pass	green	Manual by-pass open
		red	Manual by-pass closed

Chart 2

7.1.2.2 EVENT AND HISTORY MENUS

The "EVENT" menu allows viewing of all the alarms in progress, whereas the "HISTORICAL" menu allows viewing alarms which were active but which have already been restored. They are used when the alarm of the machine goes off to locate the origin and the cause of the alarm and also to establish how serious the problem is. Both have an error code and a short message. The historical menu also shows the date and the time the alarm went off.

1. The "*error code*" is the code which identifies the type of error shown by the system
2. La " *display message*" shows the message that can be seen in the "EVENT" or "HISTORICAL" menu, that is, a brief explanation of the reason for the alarm
3. The "*seriousness"* defines how serious the problem is:

Anomaly: If the alarm is caused by a temporary event
User: If incorrect or intentional manoeuvring by the user causes the alarm
Failure: If the alarm is caused by a system failure that can be restored only by the user

SYSTEM

Error code	Display message	Description	Seriousness
SY1	Inverter w/o load	Inverter without load	Anomaly
SY2	Load on back-up	Load on mains	Anomaly
SY3	Error out voltage	Error in output voltage	User /failure
SY4	High Temperature	Temperature block	Anomaly
SY5	Pretemp. alarm	Critical temperature	Anomaly
SY6	Error direct voltage.	DC Link voltage error	Anomaly
SY7	Mains error	Power supply in alarm	Anomaly

RECTIFIER

Error code	Display message	Description	Seriousness
RC1	High Temperature	High Temperature	Anomaly
RC2	Cyclic sense error.	Cyclic sense error.	User
RC3	Rectifier Error	Rectifier alarmed	Failure
RC4	Boost charge	Boost charge activity	User
RC5	Voltage Error	Error in mains voltage	Anomaly

INVERTER

Error code	Display message	Description	Seriousness
IV1	Inverter off	Inverter off	User / Anomaly
IV2	Desaturation IGBT	Desaturation IGBT	failure / User
IV3	Voltage Error	Error in inverter voltage	Anomaly / failure
IV5	Inv. Not synchronised	Error in frequency synchronism	Anomaly
IV6	Frequency error	Frequency error	Anomaly
IV7	Current > 125%	Output Current > 125%	Anomaly
IV8	Current > 150%	Output Current > 150%	Anomaly
IV9	High current	Output Current outside parameters	Anomaly

BACK-UP

Error code	Display message	Description	Seriousness
RS1	Cyclic sense error.	Cyclic sense error.	User
RS2	Voltage Error	Voltage Error	Anomaly
RS3	Frequency error	Frequency error	Anomaly

BREAKERS

Error code	Display message	Description	Seriousness
SZ1	Rectifier Error	Rectifier breaker	User
SZ2	Back-up error	Back-up breaker	User
SZ3	Output error	Output breaker	User
SZ4	By-Pass	Manual By-pass	User
SZ5	Battery error	Battery breaker	User
OP1	User mode	Jumper in the relay board	User

Chart 3

7.1.2.3 BATTERY TEST

CAUTION! : CARRY OUT THE BATTERY TEST ONLY WHEN THE MACHINE IS IN NORMAL MODE OPERATION

The battery test allows the user to check battery connection quality and fuse condition. To carry out the test press the F6 and the F3 keys together then press F6 to confirm, as specified in diagram 1. The test lasts for a minute, during which the U.P.S. takes the necessary energy to maintain its load from the battery. At the end of the test the result will appear under the form of "Good Battery" or "Bad battery".

CAUTION! : PLEASE NOTE THAT SPECIALIZED TECHNICIANS MUST CARRY OUT THE PROCEDURES DESCRIBED BELOW ONLY

In the second case, that is to say “Bad batteries”, you must check the fuses on the connecting line between the U.P.S and the battery cabinet. To do so you must measure the direct voltage on the battery fuse ends which are placed in the U.P.S and in the battery cabinet with a multimeter. If the fuses are not damaged, voltage measurement is next to zero. If the fuse check is positive, it means that the connected batteries are no longer suitable to maintain the load if there is a power shortage.

7.1.3 FUNCTIONING MODE CONFIGURATION

This product gives you the possibility of configuring the functioning mode in order to modify its use.

7.1.3.1 BATTERY CHARGE MODE

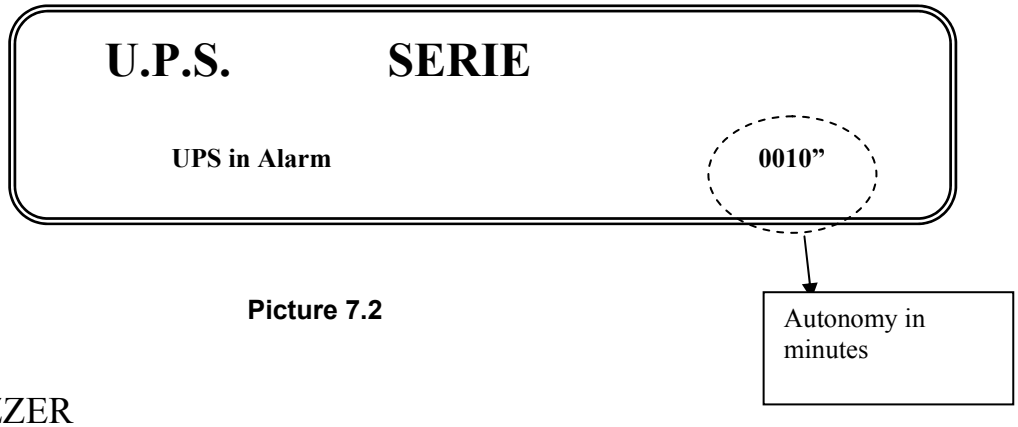
Press the F6 key and the starting key as specified in diagram 1a/b. These keys activate the starting procedure which consists of the starting of the rectifier only. This makes it possible to charge the batteries through the terminal contacts C and D. This function is very useful if the U.P.S. is not used for a long time and therefore needs complete battery charge.

7.1.3.2 FORCING ON INVERTER MODE

To activate this function press the F6 key and the F2 key together as specified in diagram 1a/b. This will mean that the system output will constantly be connected to the inverter, thus excluding the emergency mains supply. While the system is starting up it provides output energy only when the voltage level has reached set parameters. With this type of forcing it is possible to start up the U.P.S. without the emergency mains supply.

7.1.4 SYSTEM AUTONOMY

During a black-out on display will appear autonomy of the system.
This time is a function of battery voltage, and load percentage.



Picture 7.2

7.1.5 BUZZER

Internal buzzer is associated to summary alarm, you can turn on or turn off it press F2 key. If you turn off buzzer it will be off as long as all alarms off and other alarm start.

7.1.6 STRUCTURE MENU

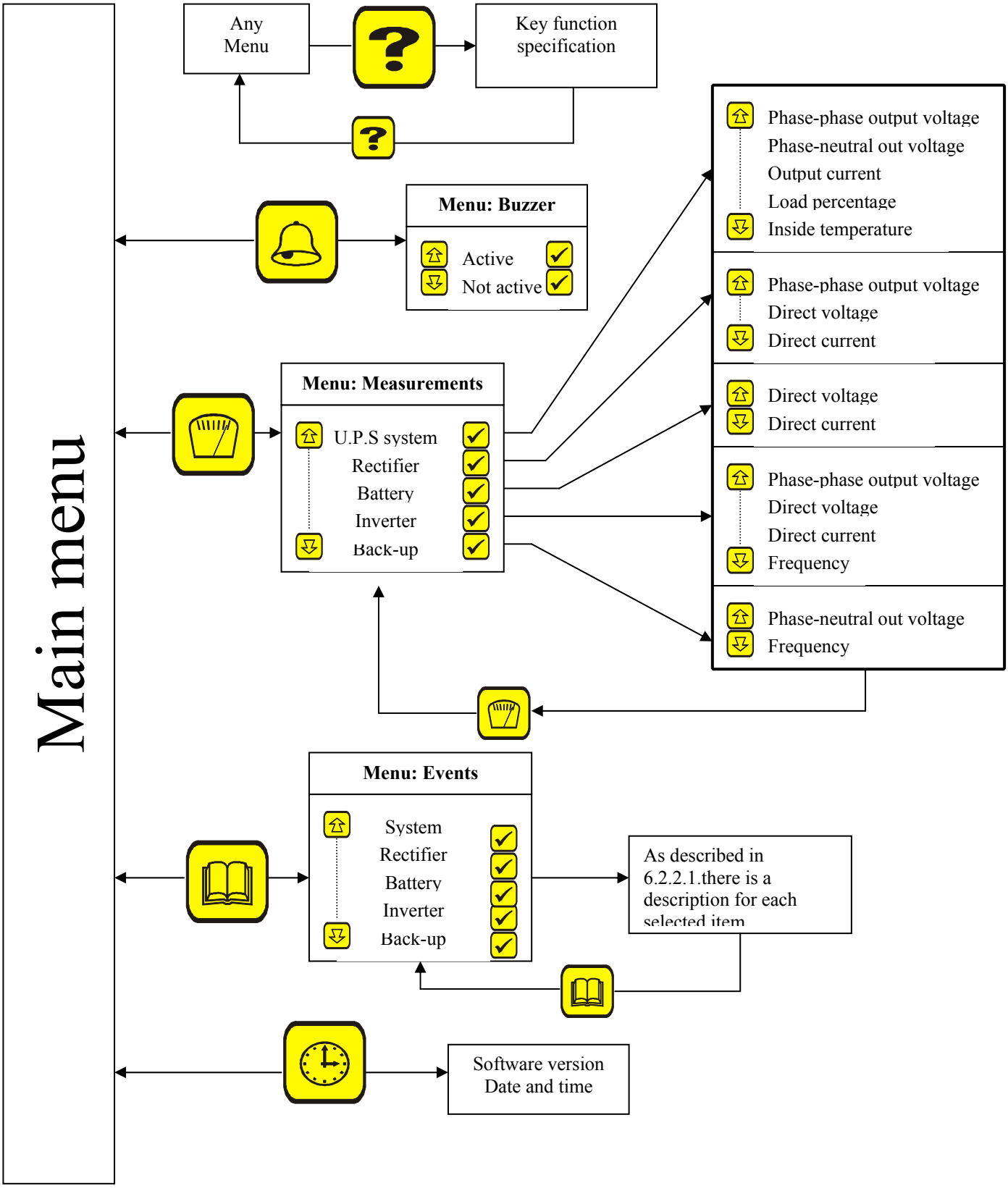


Diagram 1a

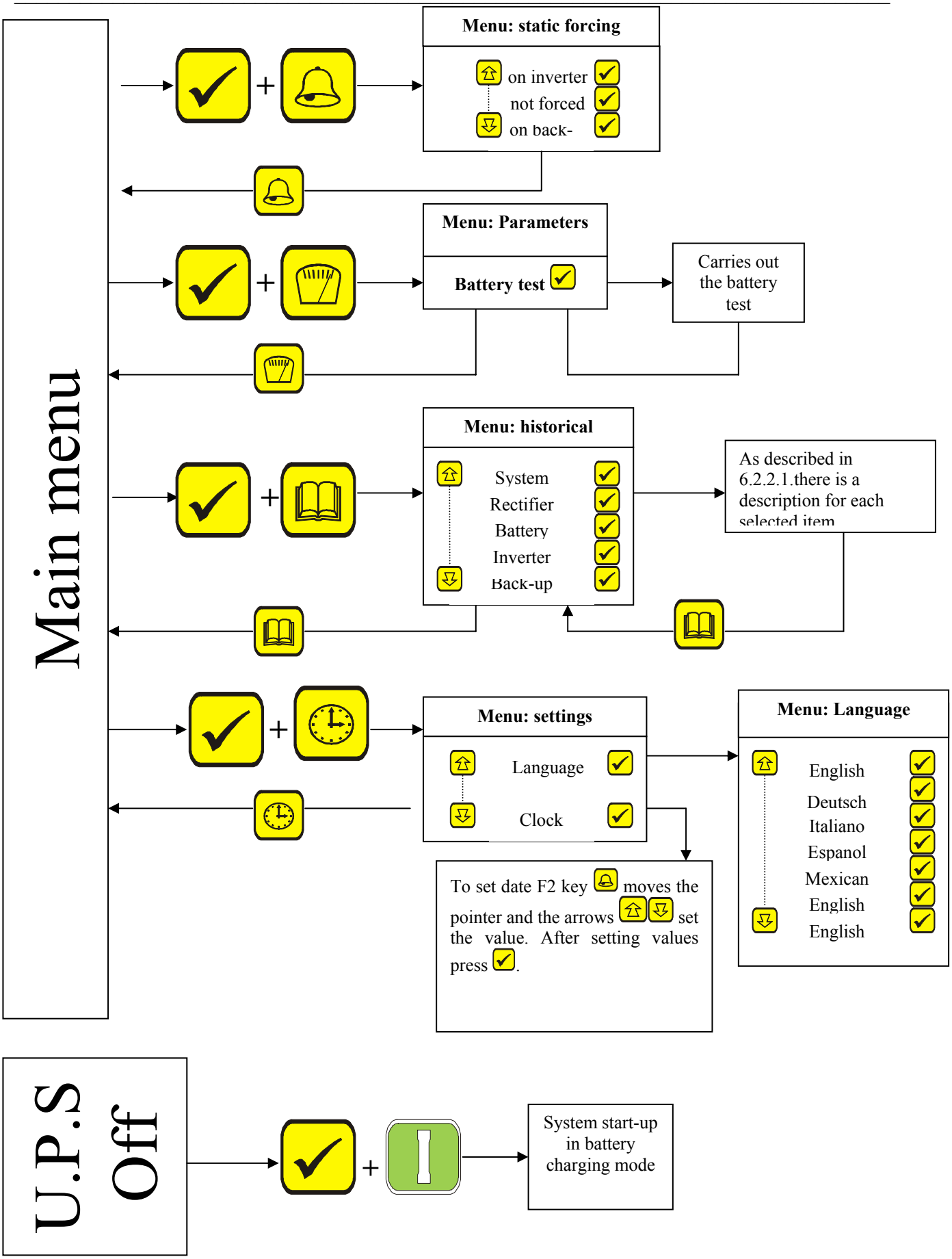

Main menu
Menu: static forcing
on inverter
not forced
on back-
Menu: Parameters
Battery test
Carries out the battery test
Menu: historical
System
Rectifier
Battery
Inverter
Back-up
As described in 6.2.2.1.there is a description for each selected item
Menu: settings
Language
Clock
Menu: Language
English
Deutsch
Italiano
Espanol
Mexican
English
English
To set date F2 key moves the pointer and the arrows set the value. After setting values press .
U.P.S Off
System start-up in battery charging mode

Diagram 1b

7.2 OTHER INFORMATION

	Button	
PR1	STOP	
PR2	HELP	F1
PR3	BUZZER	F2
PR4	MEASURE	F3
PR5	HISTORY	F4
PR6	DATE TIME	F5
PR7	CONFIRMATION	F6
PR8	UP	F7
PR9	DOWN	F8
PR10	START	
PR11	Reset of board	

Clear history without reset:

This operation is possible only if U.P.S. is in normal mode

Press F4 key to enter historical menu
In this menu F7,F8 can select the menu level
Press F6 key to enter menu and press F4 to escape
Enter into menu "Clear History", is possible erase every message in history buffer. If you wont this press F6 key to confirm erase, or press F3 to escape without erase.

Relay programming:

This operation require A11 board on machine

Press F3+F6 keys, change with F7, F8 program menu keys and select with F6 key "Relay programming" or press F3 key to escape

In the secondary menus you can select a relay (F7,F8, keys) press F6 key to confirm or F3 to escape.

In relay menu there are all the alarms possible for relay, selected alarm are marked by "*", select desiderate alarm and press F6 to confirm or F3 to escape without modify. Is possible to select more alarm for one relay. The complete default relay configuration is in chapter 11. ***Note: the led's on A11 turn on when one alarm associated to relay is in progress.***

Other measure

From version software 3.01 on are available on measure menu indication about output power, active power, power factor.

Working time

It is possible to read information about working time of machine and these info are available in terms of the hours in the following format :

On inverter: total time in which load was supplied by UPS
On reserve: total time in which load was supplied by back-up line
On battery: total time in which load was supplied by UPS and UPS supply by batteries
Summary time: UPS on time.

8 OTHER BOARD

8.1 INVERTER A02

A02 board control: AC voltage generate to UPS, output voltage, static switch, internal temperature and sync.

LED

LED			
Number	Name	Description	Colour
DL1	SIOK	Sync between back-up voltage and inverter voltage. When this occurs UPS can transfer supply of load from one line to other without discontinuity. If there is forced commuting, without synchronism, decided by the user, this will occur with a voltage dip of max. 20 ms.	green
DL2	FIOK	Back-up frequency in tolerance range.	Green
DL3	RPSKO	Cyclic sense error on back-up line	Red
DL4	VRKO	Back-up voltage out of tolerance	Red
DL5	VROK	Back-up voltage OK	Green
DL6	PRTEM	Inside the UPS there are two temperature probes, these are mounted on heatsinks with power modules, one is front of air input, the second is on back near air output. The first is temperature alarm, the second is prealarm, hair flow go from front to back. Probe turns on at 70°C.	yellow
DL7	HITEM	If air flow is too hot probe turn on and temperature alarm is set. Probe turns on at 90°C. Temperature alarm will turn off UPS and load supply is transferred to back-up line.	Red
DL8	DESAT	One or more module IGBT have desaturation	red
DL9	START	Inverter on	green
DL10	VDCKO	DClink voltage out of range	red
DL11	F0OK	Phase zero ok	green
DL12	FRAL	Problem on control of frequency generate by device	yellow
DL13	VIOK	Inverter voltage ok	green
DL14	I125%	Output current overload, over 25% of nominal value	red
DL15	II150%	Output current overload, over 50% of nominal value	red
DL16	LMAINS	Load supply by back-up line	green
DL17	VUKO	Output voltage low, under 20% of nominal value	red
DL18	LINV	Load supply by inverter voltage	green
DL19	IUMAX	Output voltage over max value	red

8.2 RECTIFIER A03

A03 logic rectifier board controls: DC voltage generate by AC/DC conversion, driver of rectifier's SCR, input current and battery current.

LED

LED			
Number	Name	Description	Colour
DL1	SUPP	Input voltage board OK	green
DL2	PHMKO	Input phase rotation wrong	red
DL3	BTEST	Battery test in progress	yellow
DL4	RDON	Rectifier on	green
DL5	BOOST	Battery boost (not used)	yellow
DL6	HTEMP	Temperature high	red
DL7	VMKO	Mains voltage out of range	red

8.3 POWER SUPPLY A04

This board supplies all other boards taking energy from A08 board and from DC voltage when rectifier is on. So it can supply the boards in case of input line black out.

LED E FUSES

LED			
Number	Name	Description	Colour
DL1	VAL	Input board voltage ok	green
DL2	+12v	Output board voltage ok	green
DL3	-12v	Output board voltage ok	green
DL4	+5v	Output board voltage ok	green

FUSES

FU1 = + DC fuse on connection with positive pole of DC voltage
FU2 = - DC fuse on connection with negative pole of DC voltage
Fuses are 6,3*32 2A

8.4 DRIVER IGBT A05

This board supply driver signal for IGBT modules.

LED

LED		
Number	Description	Colour
DL1	Isolated A -8V supply voltage	Verde
DL2	Isolated A -15V supply voltage	Verde
DL3	Isolated B -8V supply voltage	Verde
DL4	Isolated B +15V supply voltage	Verde

8.5 FUSES BOARD A06

REPLACING THE FUSES

CAUTION! : ALL CONNECTING PROCEDURES DESCRIBED IN THIS CHAPTER MUST BE CARRIED OUT BY AUTHORIZED ELECTRICIANS OR BY QUALIFIED TECHNICIANS.

CAUTION! : BEFORE REPLACING THE FUSES YOU MUST CARRY OUT THE MANUAL BY-PASS PROCEDURE WITH THE U.P.S. DISCONNECTED (CHAPTER 5)

A nut screw fastens each fuse. When replacing a fuse you must unscrew the two knurled nuts corresponding to the fuse, which must be replaced, remove the washers, replace the fuse and put back the washers and the knurled nut in this order. The fuses used are extra-fast fuses for the current specified in charts 9a and 9b.

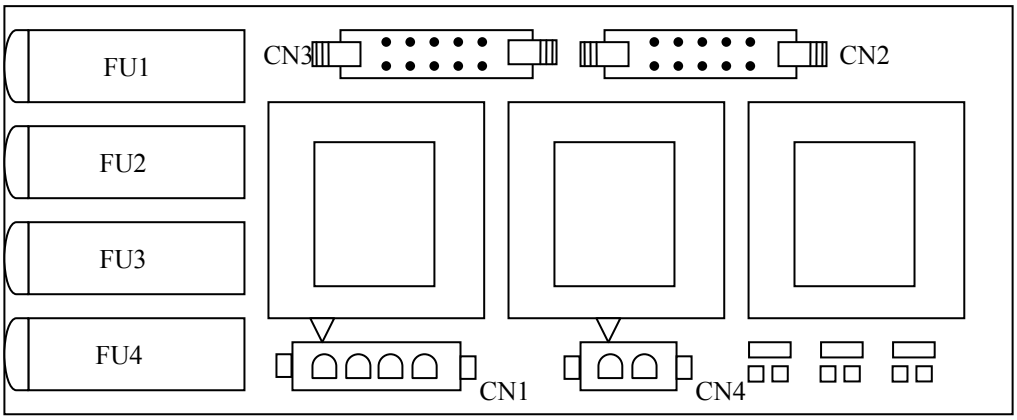
If you replace fuses with models different to the above described the guarantee will no longer be valid.

8.6 STATIC DRIVER A07

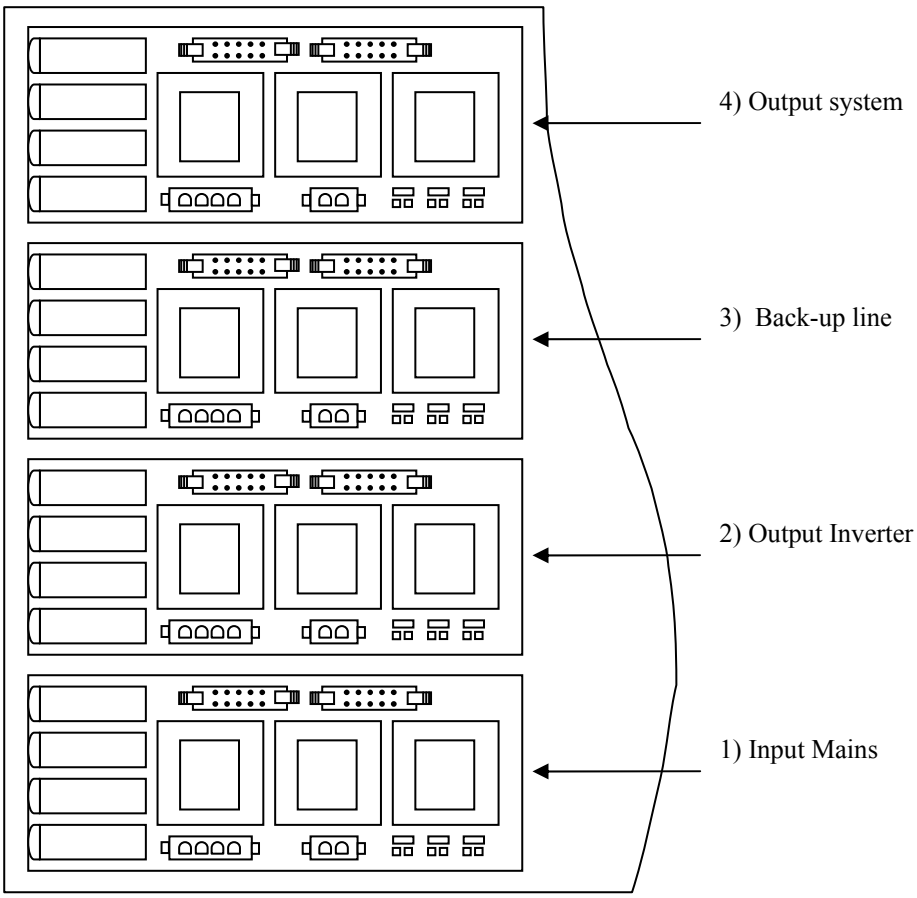
Static switch is made by SCR, this board drives them.

8.7 TRANSFORMER BOARD A08

These boards supply A04, voltage probes for logic board and fans.



Picture 8.1



Picture 8.2

The positioning of boards on device is as in picture 8.2, on CN1 enters AC voltage to measure, from CN2 comes out a signal proportional to this voltage, CN3 supplies voltage to A04, CN4 supplies AC voltage to fans (CN4 on A08 position 1 supplies A04).

Position	Description
1	Mains input voltage
2	Inverter output voltage
3	Back-up input voltage
4	Static output voltage

Fuses

0.5A 250V 6x32 (FU1 FU2 FU3)
0.2A 250V 6x32 (FU4)

8.8 RECTIFIER DRIVER A09

This board takes signal generated from rectifier A03 and transforms it in signals for SCR driver, so it's possible AC-DC conversion.

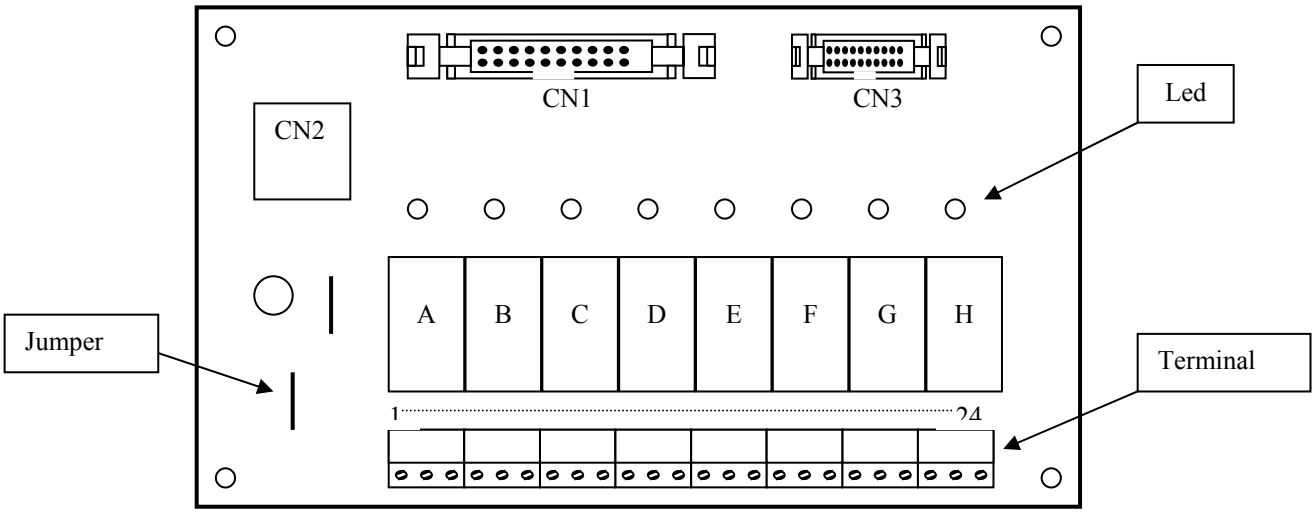
8.9 HALL BOARD A10

On machine there are eight hall probes, you can find them by flat and wire on which they are positioned

Position	Wire	Flat	Jumper	Description
1	13	FC3	Jp1	Positioned on wire from DClink to battery switch, it is used to read Dc current from Dc to battery
2	13	FC3	Jp2	Positioned on wire to connect retcifier to inverter, it is used to read current between these parts
3	20	FC14	Jp1	Measure current on phase R generate to inverter
4	23	FC14	Jp2	Measure current on phase S generate to inverter
5	26	FC14	Jp3	Measure current on phase T generate to inverter
6	32	FC17	Jp1	Measure output system current on phase R
7	33	FC17	Jp2	Measure output system current on phase S
8	34	FC17	Jp3	Measure output system current on phase T

8.10 RELAY BOARD

The relay board is a user interface system, which allows viewing of the U.P.S. State through eight diverters, one standard and seven optional, which are controlled. These contacts are used especially to start up the acoustic and visual alarm systems when specific events occur. The types of relays, which are used, allow connecting functioning electric equipment up to 250V alternating, with a 5A maximum absorption.
For each relay we can associate an alarm or we keep the standard setting. In case of particular requirement for relay programming, to aks our engineers.
The position of this board varies according to the model, but in any case once you have removed the second access it is always visible and accessible to the user.



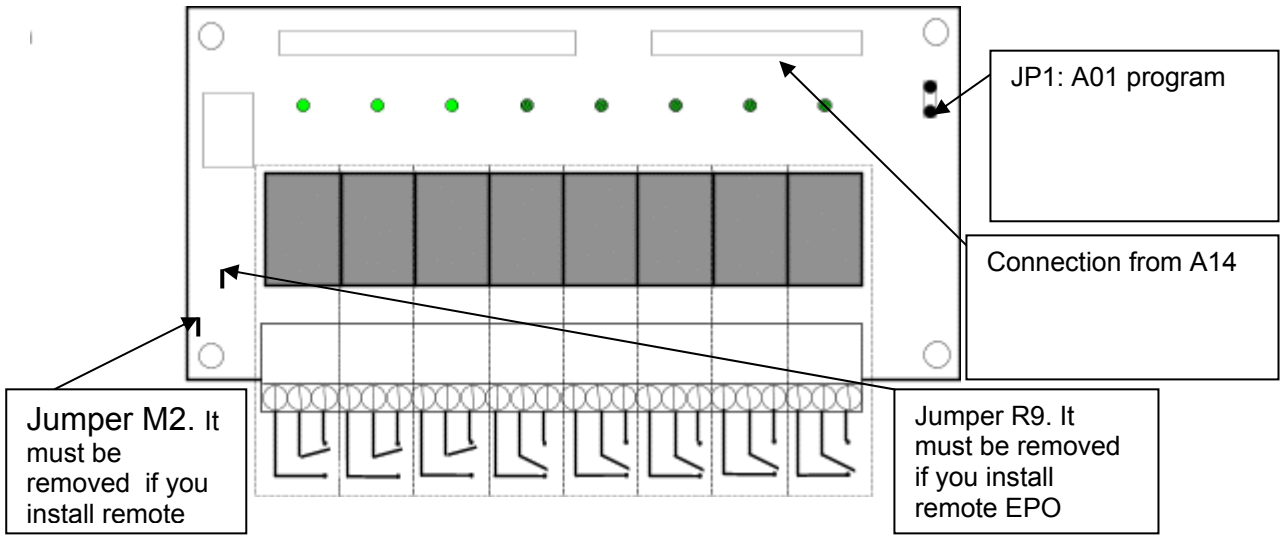
Picture 18

RELAY	RELATED STATE (STANDARD)	CONTACT NUMBER	AVAILABLE CONTACTS
A	RECTIFIER STARTED(OPTIONAL)	2	1 N.C.
			3 N.A.
B	INVERTER STARTED(OPTIONAL)	5	4 N.C.
			6 N.A.
C	LOAD ON RESERVE LINE(OPTIONAL)	8	7 N.C.
			9 N.A.
D	LOAD ON INVERTER(OPTIONAL)	11	10 N.C.
			12 N.A.
E	PRE-ALARM TEMPERATURE(OPTIONAL)	14	13 N.C.
			15 N.A.
F	TEMPERATURE ALARM OR DESATURATION(OPTIONAL)	17	16 N.C.
			18 N.A.
G	LOW BATTERY VOLTAGE(OPTIONAL)	20	19 N.C.
			21 N.A.
H	OUTPUT CURRENT > 125%(OPTIONAL)	23	22 N.C.
			24 N.A.

ALARM CONFIGURATION TABLE	
Output current > 150%	Load on reserve
Output current > 125%	Load on inverter
Frequency alarm	Reserve frequency KO
Sincro alarm	Reserve voltage KO
Zero phase alarm	Wrong reserve phase seq.
V Inverter bad	Main voltage KO
IGBT Desaturation	Boost charge
Inverter on	Rectifier ON
Summary alarm	Rec. Phase seq. Wrong
VDC < 350V	High temp. Rectifier
Iout > Rating current	Relay board jumper
Power supply alarm	Battery switch
DC Link fault	By-pass switch
Pre Temp. Alarm	Output switch
High Temp. Alarm	Reserve switch
Voltage out KO	Main switch

Chart 4 (N.C.= Normally closed N.O.= Normally open)

The states associated to the relay are standard, but a specialised technician according to necessity can modify them. You can verify the state of the relays with the led's (picture 18) which are placed above each relay.



Picture 8.4

8.11 RECTIFIER FILTER A13

This board is a RC filter on DC voltage generated from rectifier.

8.12 BATTERY FUSE A15

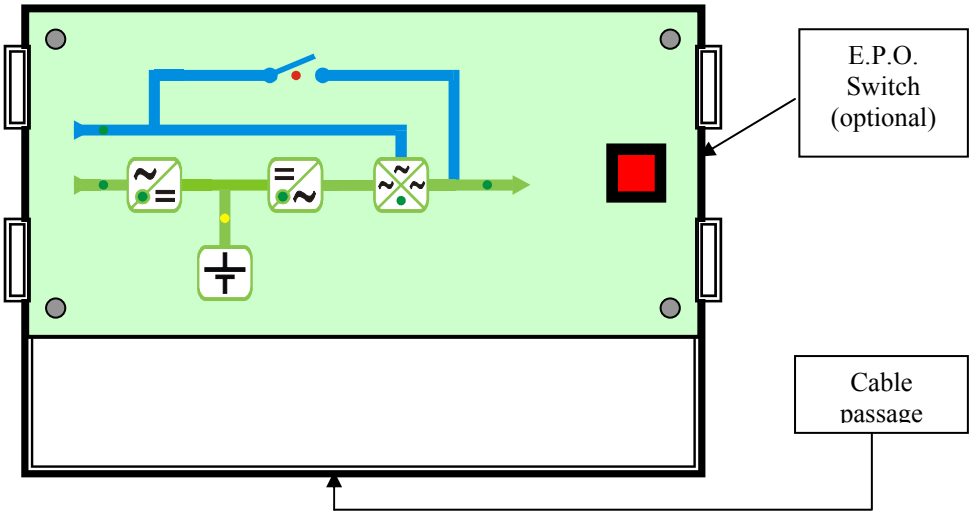
It is on battery connection line. It is placed on A13 wire to protection against battery overcurrent.

9 BACK-UP LINE

Back-up line (sometime named reserve or auxiliary line) is available only on demand, with this line is available an other input line.

10 REMOTE PANEL (optional)

The remote panel is an extension of the synoptic supervision (picture 17 plus chart 1); this is particularly useful when you need to monitor machine functioning in a remote place. Furthermore, it is possible to supply it with an E.P.O. switch (chapter 4.2.1). This device is composed of two main parts, one interface board inside the machine and an actual synoptic which should be installed in a place of your choice to carry out monitoring **at a maximum distance of 25 meters**.
The synoptic is in a wall box with a bottom cable passage.
Please remember that the remote panel needs a 220-240V/50-60Hz power supply, which is to be taken only from the U.P.S. output.
A specialized technician is recommended to install these devices.



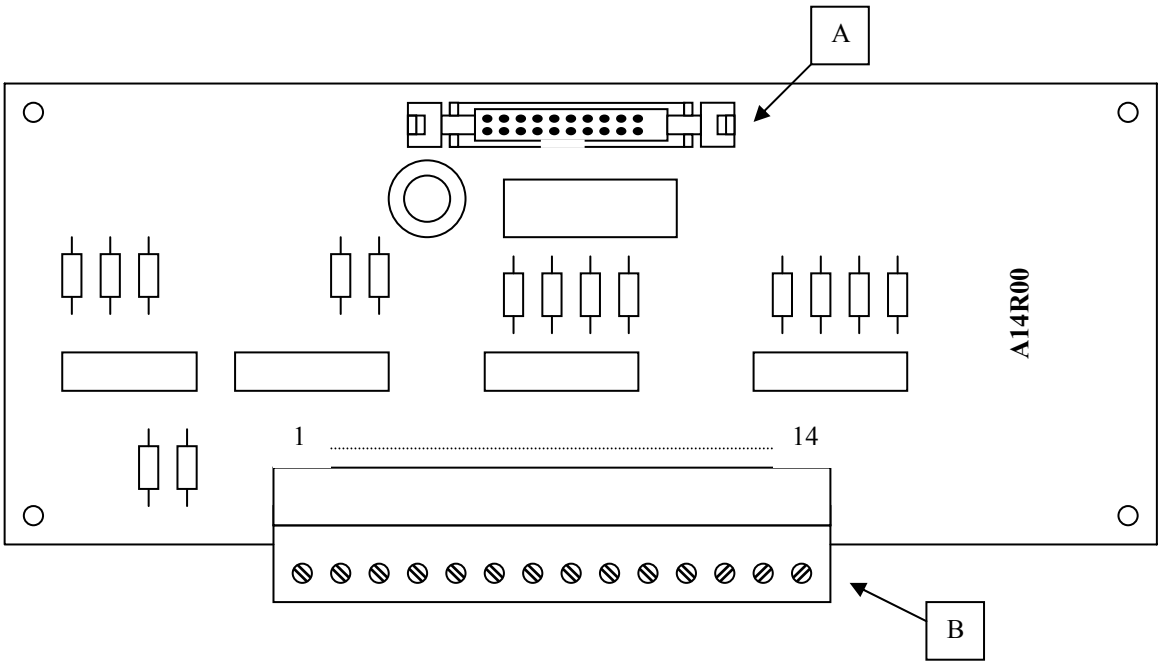
Picture 10.1

Please refer to picture 7.1 for the meaning of the state of the leds.

INSTALLATION OF REMOTE PANEL WITHOUT E.P.O.

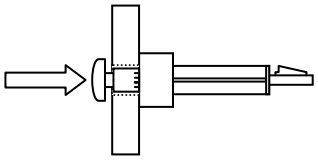
To install this board please follows the procedures below:

Make sure that the U.P.S. is off and that all the switches are off (if the U.P.S. is already operative please proceed to by-pass setting chapter 5)
Unscrew the set screws from the second access panel of the U.P.S. and remove it.
Check if there is an interface board (picture 20); (present only if requested before purchase). Its position varies according to the different models but it is always viewable and accessible by the user.



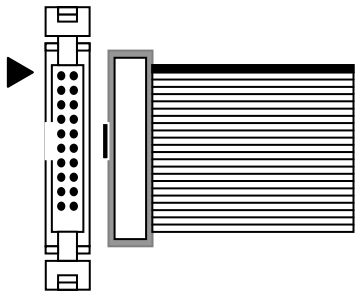
Picture 10.2

If there is a board please go directly over, otherwise continue with the following procedures.
Insert the four supports for the printed circuit in the holes



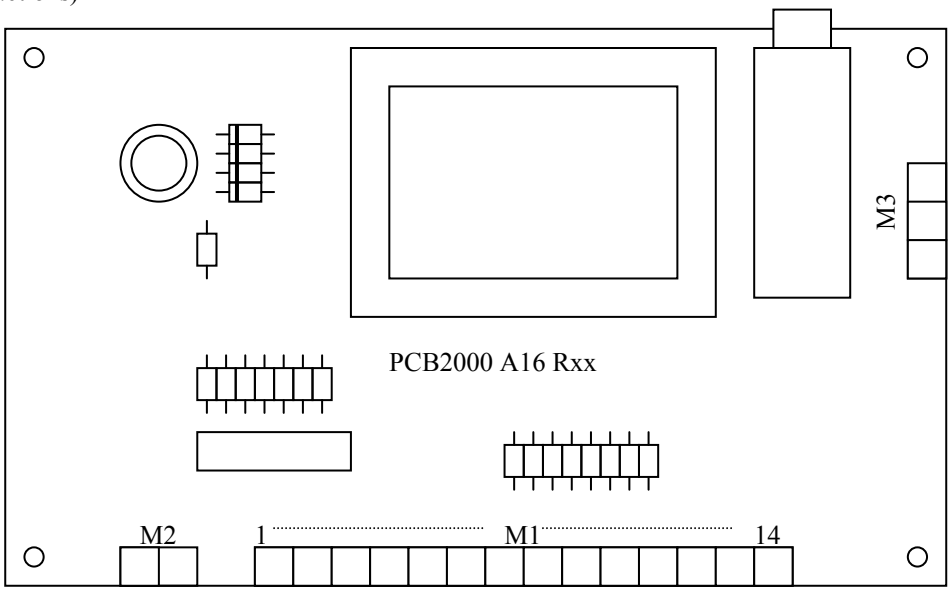
Picture 10.3

Fasten the board as specified in picture (named 0 A14Rxx), to the supports you have just inserted
Create a connection with the supplied flat-cable between connector A and connector CN3 on the relay board , respecting polarity, that is to say, the coloured wire level with the sign on the board



Picture 10.4

Position the remote panel in the place chosen for monitoring
Proceed to connect power supply (220-240V/50-60Hz) to the M3 connector of the A16Rxx board, remembering to leave the central terminal free
Carry out connection between interface connector indicated with the letter B (picture 20) and the M1 connector . Bear in mind that the connection must be carried out symmetrically (pin1-pin14, pin2-pin13, . . ., pin13-pin2, pin14-pin1)
Close the U.P.S second access by fastening the screws
Continue the starting procedure (if already operative restore functioning from U.P.S by-pass following the relative instructions)



Picture 10.5

The remote panel kit is composed by:
N 1 remote panel (with A16 board installed inside)
N 1 interface board A14 (installed on machine)

1. Mount remote panel in a place designed to monitoring
2. Supplies it (220-240V/50-60Hz) from socket M3 (on A16 (picture 10.2)), where pin1 is the phase, and pin 3 is a neutral, pin 2 must be void
3. A14 and A16, must be connected by 14 poles wire not supplied. Correspondence between A14 and A16 connector is as follows:

A14	1	2	3	4	5	6	7	8	9	10	11	12	13	14
A16	14	13	12	11	10	9	8	7	6	5	4	3	2	1

INSTALLING THE REMOTE PANEL WITH E.P.O.

CAUTION! : FOLLOW THE INSTRUCTIONS VERY CAREFULLY. ANY MISTAKE WILL CAUSE AN OUTPUT VOLTAGE DROP.

To carry out the installation of a remote panel with E.P.O., you must first carry out all installation procedures for the normal remote panel, as in paragraph 6.4.1 then check the actual efficiency of the remote panel by checking that the leds respect the colours on the control panel.
After doing so please carry out the following instructions:

Make sure that the U.P.S. is off and that all the switches are off (if the U.P.S. is already operative please proceed to by-pass setting chapter 5)
Unscrew the set screws from the second access panel of the U.P.S. and remove it.
Using cutting nippers cut the jumper as shown on the relay board (picture 18)
Turn on the “Reserve switch” disconnecting switch, the message “UPS Off” will appear on the display and all the synoptic leds will turn red except for led “H” which will be green; wait till led “A” (picture 17) starts flashing
Turn on the “Main switch” disconnecting switch, led “B”(picture 17) will turn green

Press the  button for about two seconds, the message “Starting up procedure started”, and if the procedure has been carried out correctly led “C” (picture 17) and led “E” will turn green in sequence and the message “UPS alarmed” will appear on the display
Press keys F6+F3 with the arrows F7-F8 select “Level of EPO”, press F6 to confirm, select “Stop completed” and press F6.Press F3 to go back to the main menu
Press the E.P.O. switch on the remote panel and check that the emergency button actually works (leds C, E, F picture 17) chapter 6.1 must turn red and the message (Emergency EPO block) will appear
Reset the switch
Continue the starting procedure (chapter 4) (if already operative restore functioning from U.P.S by-pass following the instructions in paragraph 5)

11 EMERGENCY POWER OFF

Partial shutdown: results in deactivating the static and the inverter, which in consequence will turn off all the electric equipment connected to the system's output, whereas the rectifier and battery will continue receiving charge current.

Total shutdown deactivates all functions (including the rectifier). During the emergency the message "warning emergency shutdown" will appear on the control panel.

CAUTION!:
THE FOLLOWING PROCEDURE WILL DISCONNECT THE LOAD

EPO (Emergency power off) is used to turn off rectifier, inverter and static bypass as soon as epo contact is close. Load is not supplied. EPO is useful in emergency situations (for example fire) to disconnect load from supply line.

11.1 EPO TYPE

11.1.1 EPO ON CONTROL PANEL

If EPO is installed on machine, it is always located on control panel.

11.1.2 EPO ON REMOTE PANEL

If EPO is installed on remote panel, it is always visible on this. So it is possible to force epo from the remote place.

11.2 PROGRAM EPO

By control panel is possible to program the behaviour of EPO.

Insert J1 on A11

Press F6+F3 keys and enter menu
By F7, F8 keys select EPO and press F6 to confirm
By F7,F8 keys select behaviour type

Is possible to select between three modes:

Not active
Partial shutdown
Total shutdown

Esc to program menu and remove J1 to A11

11.3 RECOVERY FROM EPO

Press epo button and then press start green button on control panel

12 RS232 SERIAL CONNECTION

Serial port uses RS232 standard. This is possible only in machines with control kit. Communication protocol used is compatible with U.P.S. software by Generex and Megatech.

Furthermore the adapter is able to use other interface protocols:

- **SNMP** for UPS wire connection
- **USB**
- **RS485** (half-duplex o full-duplex)

It's possible by server and enterprise management SNMP (Simple Network Managing Protocol), or via world wide web to make a remote monitoring and management. Connect U.P.S. in LAN/WAN, with usually "Ethernet" connection (able as optional interface, or RS232), is possible monitoring UPS as any other wire elements with its IP address.

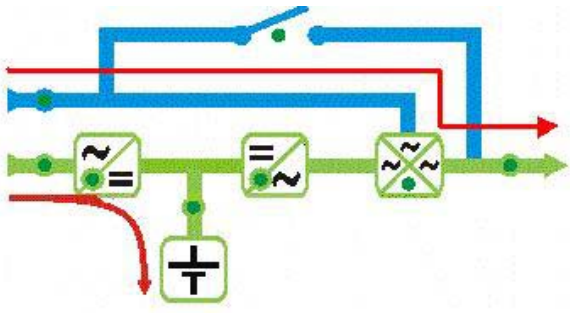
Note:
All connected devices with independent supply, must be supplied by UPS protected line

Wire for RS232 must be serial male DB9 socket on side U.P.S (connect to B24), and serial female DB9 socket on side PC.
Max distance for connection is about 20 mt. Baud rate standard is 2400 Bps for Generex (www.generex.de) and Megatech (www.metatc.com.tw) protocols.

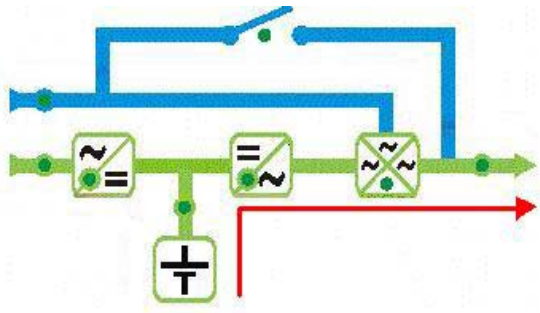
Connection pin of connection wire	
Computer	Ups
Female DB9	**Male DB9**
Pin 2	**Pin 9**
Pin 3	**Pin 6**
Pin 5	**Pin 7**

GREEN MODE

In green-mode configuration output voltage is not controlled, load is direct connect to input mains line by static switch.. In this case voltage and frequency on output are dependent of variations of input. Ups only supplies battery. U.P.S. will be activated only in case of input black out. This configuration is recommended only for not critical load, for example pc or server.



Picture C1



Picture C2

Typical use of this configuration is in lights control, or for user that don't require continuous supply. The system performance is more than traditional configuration (about 98%).

13 SNMP

13.1 SNMP

SNMP adaptor is able to monitor measure and alarms of UPS. It needs to the control kit B00. Shutdown software can advise the user in case of main fault, can control automatic pc shutdown if battery autonomy is turning off. Monitoring software can read in real time measures on device (output voltage, input voltage, temperature, etc).

Is possible to know alarms, voltage break down, anomalies that took place during working time or in progress, it is possible to send emails, system shut down etc.

13.2 INSTALLATION

Kit Mini NetAgent
It is suggested a extension wire to connect B24 and device

Extension wire	
Female DB9	**Male DB9**
Pin 9	**Pin 9**
Pin 6	**Pin 6**
Pin 7	**Pin 7**

For software installation you can see www.megatec.com.tw.

14 OUTPUT FREQUENCY

CAUTION!:
It is necessary turn off the U.P.S and disconnect it from load

It is possible to set input/output frequency to 50 Hz or 60 Hz. In order to change frequency ask a qualified technicians

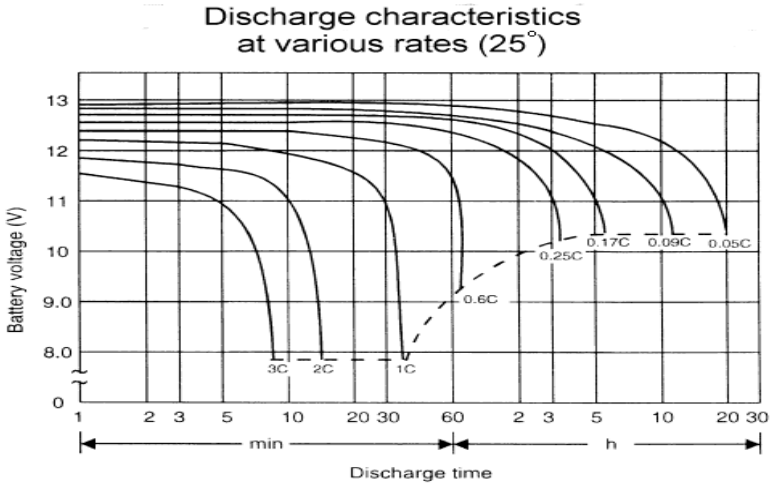
Don't turn on the U.P.S. if input and output frequency are not matching

15 BATTERIES

The system guarantees uninterruptible power by using buffer batteries directly connected to the AC/DC conversion output. A periodical check of the Battery State will prevent unpleasant mishaps that may occur if there is a power shortage, such as short autonomy or in extreme cases even non-intervention of the system with consequent load loss. If storing battery cabinets batteries please remember to recharge them every four months (chapter 6.1.3.1), in order to guarantee the best maintenance possible.

For transport safety the batteries inside the cabinet are disconnected in some points to discontinue circuit continuity, therefore you must restore these connections when installing the batteries.

As already mentioned system autonomy depends on the type of battery used and, above all, on their capacity. Battery capacity is expressed in ampere/hour, from this parameter you can work out system autonomy. This expresses the amount of current delivered in a given time interval, discharging a storage battery at a given condition (discharge current), until it reaches a set voltage. For example, a 50 Ah capacity can deliver 2,5 A for 20 hours. Excessively hot temperatures, over 40°C, can drastically reduce battery life, due to plate corrosion caused by an increase of acid aggressiveness. However, the system has a device, which can reduce working voltage according to the temperature, thus improving battery life.



The discharge characteristic varies according to the make and model but it may be compared to the graph above. The buffer system used is composed of a string of 32 batteries connected in series. The capacity of each single string corresponds to the capacity of a battery, whereas for parallel series it results in the sum of all the strings. In this manner it is possible to increase system autonomy.

15 TECHNICAL SPECIFICTIONS

Rectifier													
Configuration	Thyristor bridge full control – option 12 pulse												
Nominal voltage	380-400-415-Vac, 3Phase +N +PE												
Frequency	50/60 Hz, +/- 10% selectable												
Power factor	0.8 inductive @ 100%load @ 400vac												
Tolerance on VDC	+/-1%												
Ripple on VDC	<1%												
Max charging batteries current	15	15	15	15	15	15	20	20	20	20	20	20	20

Battery	
Rated buffer charge @ 20°	436V
Voltage discharge	320VDC (adjustable)

Inverter	
Configuration	Three phase bridge IGBT with pwm control
Nominal output voltage	380-400-415Vac, 3phase +N +PE
Transformer	Standard

Output voltage tolerance	
Static stability	+/-1%
Load variation 0%-100%-0%	+/-8%, static stability in 40ms
Load variation 0%-50%-0%	+/-3% static stability in 40ms
100% unbalance load (IEC62040)	+/-3%

Output voltage distortion	
100% linear load	2% THD max
80% non linear load	5% THD max
Crest factor	3:1 load 80%

Voltage symmetry	
100% balanced load	120+/-1%
100% unbalanced load (80%-0-80%)	120 +/-2%

Output frequency	
From internal quartz	50/60 Hz +/-0.01%
Frequency windows	+/-5%
Overloading (on inverter)	125% per 10 minute, 125%-150% per 60 second
Short circuit (on inverter)	150% of nominal current for 60 sec with in limitation system

Static bypass	
Configuration	Dual input
Voltage windows	+/-10% of nominal system voltage (adjustable)
Overload (on bypass)	110% continuous, 200% for 5 minute, 1000% for ½ cycle
Manual bypass switch	Standard

Serial	RS232 with Megatec/ Option: SNMP adapter, RS485 (xor RS232)
Contact relay	Board with 8 programable relay